PACKAGE engineering

Adhesives for high-speed packaging

A detailed review of hot melts—adhesives that have no vehicle, set by cooling, and provide the speed of setting demanded by today's packaging operations. (See page 25)

Basic principles underlie package tests

A guided tour through the language of advanced physics reveals clear-cut explanations of such principles as stress and strain, density, hardness, force, and gravity—among others. (See page 36)

Where do we put that new packaging line?

Dovetailing a new line into an existing battery of lines involves training crews in new techniques, and installing and modifying a range of mechanical equipment. (See page 30)

Complete table of contents on Page 2

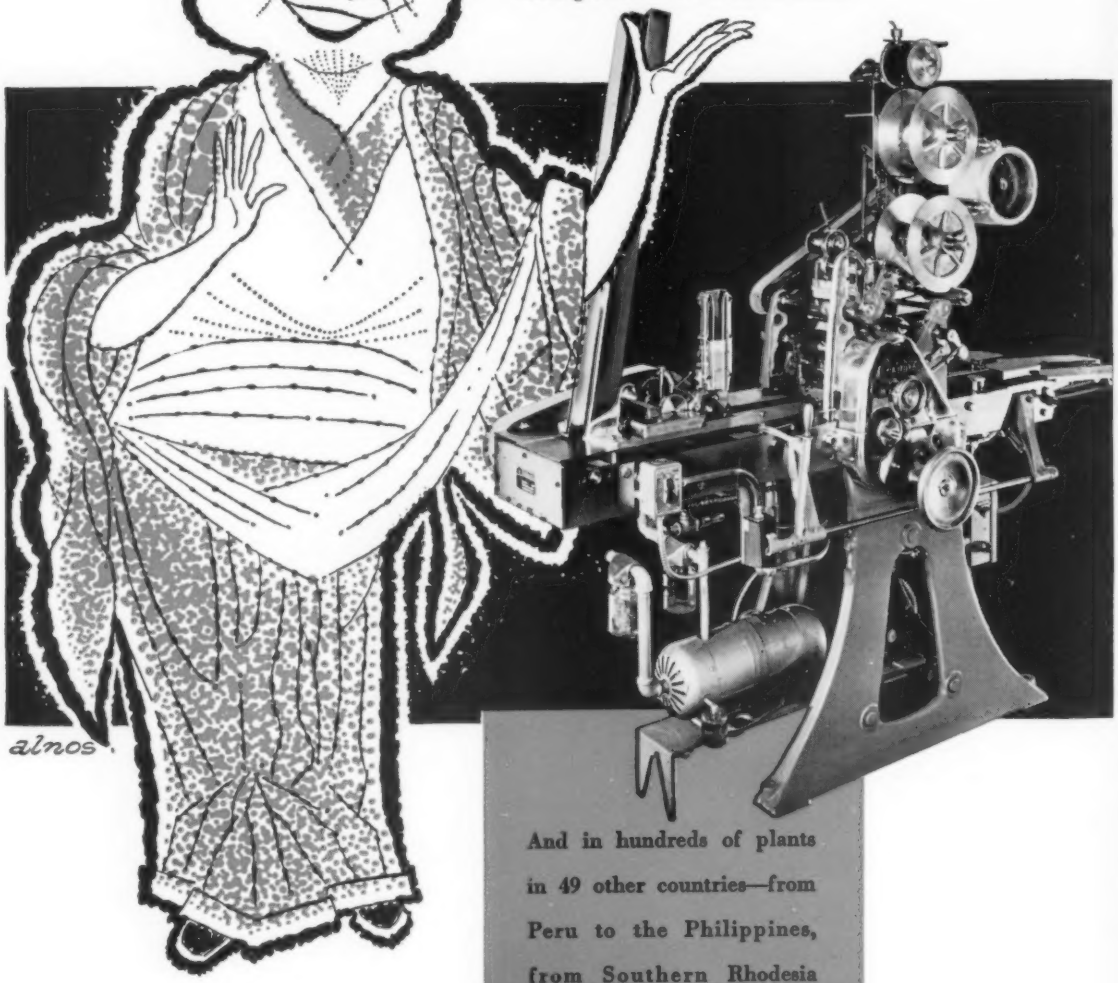
APRIL 1958

VOLUME 3 • NUMBER 4

In Hong Kong they say:

世界上之最經濟·最汎速之包裝機 司梗田下

Translation: "For fast, money-saving overwrapping, there's nothing like our Scandia machine."



And in hundreds of plants in 49 other countries—from Peru to the Philippines, from Southern Rhodesia to Thailand — Scandia's machines evoke the same praise.

CHARTING NEW PATHWAYS IN PACKAGING

SCANDIA
PACKAGING MACHINERY COMPANY
NORTH ARLINGTON N. J.

Makers of Standard and Custom Machines for Bundling · Banding · Multiple Wrapping · Stamping · High-Speed Wrapping

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Weep no more my lady

Searching for the right color and pattern—heaving around heavy doubled-and-rolled bolt goods all day—is no fun for the saleslady (*or* the customer)!

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And it doesn't attract dust.

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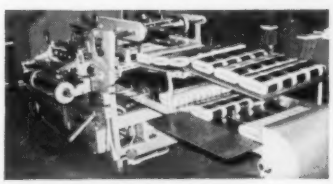
Costs no more than those that lack these excellent qualities of VITAFILM! (Have you checked the new low prices?)

Why wait? WRITE: Goodyear, Packaging Films Dept. P-6432 Akron 16, Ohio.



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Vitafilm

by

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The finest in sheer protection

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For your calendar

April 22-24. Research and Development Associates, Food and Container Institute, annual meeting. Palmer House, Chicago. Contact: Col. Rohland A. Isker, Secretary, Research and Development Associates, Food and Container Institute, 1819 W. Pershing Road, Chicago 9, Illinois. *Telephone: Lafayette 3-5500, Ext. 4262.*

May 8-10. Western Industrial Packaging and Material Handling Show, Great Western Exhibit Center, Los Angeles. Contact: J. M. Druliner, American Material Handling Society, 2807 Sunset Blvd., Los Angeles 26, California. *Telephone: DU-5-7442.*

May 25-29. Institute of Food Technologists, 18th Annual Meeting, Palmer House, Chicago. Contact: Charles S. Lawrence, executive secretary, Institute of Food Technologists, 176 W. Adams Street, Chicago 3, Illinois. *Telephone: Andover 3-6268.*

May 26-28. AMA National Packaging Conference, Hotel Statler, New York. Contact: E. King Graves, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

May 26-30. AMA National Packaging Exposition, New York Coliseum, New York. Contact E. King Graves, American Management Association, 1515 Broadway, New York 36, New York. *Telephone: Judson 6-8100.*

August 11-13. Western Packaging & Materials Handling Exposition, San Francisco Civic Auditorium. Contact: Exposition Office, 759 Monadnock Building, San Francisco 5, California. *Telephone: Douglas 2-7876.*

October 13-15. Packaging Institute, 20th Annual Forum, Edgewater Beach Hotel, Chicago, Illinois. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, New York. *Telephone: Murray Hill 7-8875.*

October 14-16. Society of Industrial Packaging and Materials Handling Engineers, 13th National Industrial Packaging and Handling Exposition, and SIPMHE short course, Chicago Coliseum, Chicago, Illinois. Contact: C. J. Carney, managing director, Society of Industrial Packaging and Materials Handling Engineers, Suite 1534, 14 E. Jackson Blvd., Chicago 4, Illinois. *Telephone: Harrison 7-6123.*

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

Articles

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A close look at hot melts and what they offer to high-speed packaging operations.

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36 Looking at physical principles that explain packaging tests, by Martin S. Peterson, chief, technical services office, Quartermaster Food and Container Institute
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52 Nails and their characteristics in boxes and crates, by L. O. Anderson, engineer, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture
An authoritative look at types of nails, their application, and their withdrawal resistance.

58 Simple device equalizes case packing workload, saves packers from counting cans
A star wheel and magnets go together to kick out every 12th can—thus "marking" workloads.

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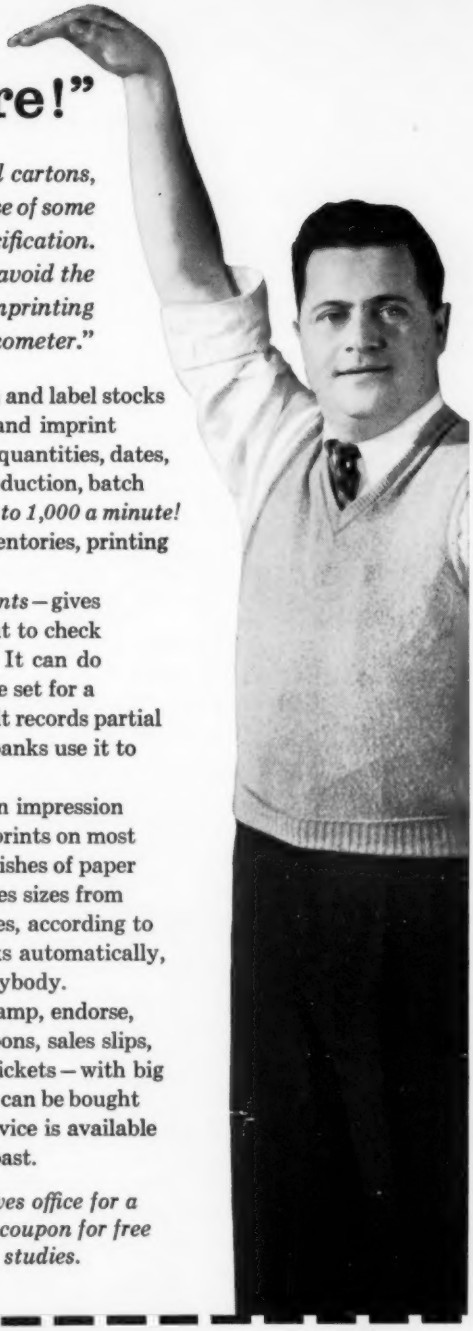
Reader Service Card inside back cover

Our December 1958 issue will carry a cumulative editorial index for the year listing our feature articles by subject, author, and other headings.

"Piled up to here!"

"Used to have half our stockroom filled with small cartons, piled higher than a man's head – all useless, because of some change in content, weight, size, or some other specification. Cost us thousands of dollars every year! Now we avoid the waste, cut inventory and printing bills, by imprinting standard cartons as we need them – with our Tickometer."



- You can limit your carton and label stocks to basic forms and sizes – and imprint weights, sizes, lot numbers, quantities, dates, colors, etc., for the day's production, batch or special run – at speeds *up to 1,000 a minute!* And you cut down your inventories, printing bills and wastage.
- The Tickometer also *counts* – gives you a label or package count to check production and shipments. It can do consecutive numbering or be set for a predetermined count – and it records partial or full totals. So accurate, banks use it to count currency!
- It registers exactly, has an impression surface of 2 3/16 by 7/8 inches, prints on most all standard weights and finishes of paper and light card stock. Handles sizes from 1 x 2 inches to 15 x 15 inches, according to model size. Feeds and stacks automatically, and can be easily run by anybody.
- It is also used to mark, stamp, endorse, date, cancel and *count* coupons, sales slips, checks, forms, cards, tags, tickets – with big savings in time and effort. It can be bought or rented. Pitney-Bowes service is available from 302 points, coast to coast.

Call the nearest Pitney-Bowes office for a demonstration. Or send the coupon for free illustrated booklet and case studies.

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Made by the originator of the postage meter . . . offices in 107 cities in U.S. and Canada.

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A note from the Publisher

Recently I talked to an advertising man who is instrumental in determining how one of his accounts — a large producer of packages — tells his story to the packaging field. He deprecated the importance of the engineering-research group in the packaging field, basing his statements on a survey made by the Folding Paper Box Association of America. If this be the conclusion of this survey, I think it does a great disservice to all of the packaging field as well as to its own members.

Certainly it is true that most packages are bought in retail stores and must be attractive and appealing to the buyers' eyes, but packaging itself is still done in a factory. Sooner or later every package is a problem of package engineering, either in how it will run on a machine or how it compares with some other packaging material. The vendor who talks only to the sales department is headed for trouble when he gets an order — if he does.

For instance, a manufacturer of filling machines told me recently of a distiller who came to them for a filler for a gift decanter. After the glass decanters were produced, they were found to be 1/4 inch too high for a standard filler. This package, sold only with the sales aspect in mind, resulted in unnecessarily increasing the cost of the package because of slower filling speeds.

The packaging field today is far more complex than it was as recently as five years ago and shows every indication that it will become even more so. A big problem that will increase the complexity of the packaging field in the future will be the need for more food because of greater population — in fact, the need for more packaged goods of all kinds. Less land is available every year for farming because of widening dust bowls, the need for more housing, more factories, etc., thus making the elimination of food spoilage even more emphatic than it is right now. Radiation preservation of food appears to be the best bet, and this will increase the complexity of packaging tremendously. All of today's packages could become obsolete because radiation could affect the properties of the packaging materials used, or changes in the shapes of packages could be demanded by the geometry of the radiation source. For example, in the case of electron generators, the ideal shape would be a package with a rectangular cross section; on the other hand, a cylindrical shaped package may be ideal if sterilization is done with a highly radioactive solution circulated through a nuclear reactor. Or, perhaps the commercially acceptable method of radiation sterilization will be a method not now known — or, if known, at least not publicized at this time.

Few general management or sales people are technically qualified to select packages on the basis of what any particular package will do to their companies' cost on the production line, or what it will do to shelf life or protection of the packaged product.

The importance of the engineering-research-development group in the packaging field is greater today than it ever was, and will become even more important in the future — both in size and in value to sound management.

Angus J. Ray
Publisher

PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

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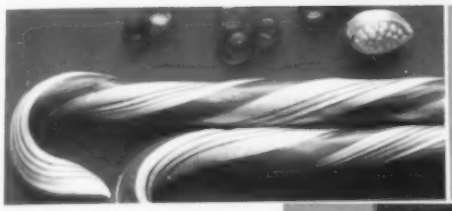
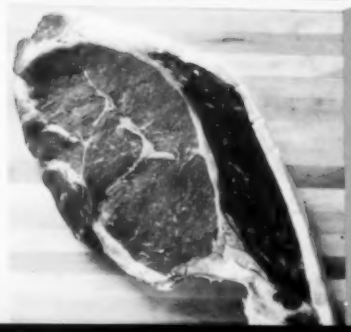
BPA

For more information circle No. 204 on Card

The package that sells cookies must instantly say tempting oven-freshness and crispness. This Dobeckmun Metalseal package does both for these Keebler Chocolate Circle Cookies by the vivid sharpness of the printing and the convincing quality of the protection it provides for a quality product.

Packages for performance...





Dobeckmun Metalseal is as good as it looks when it comes to keeping cookies, candies, crackers and frozen foods perfectly fresh! This is saying a lot because Metalseal can't be matched for instant eye appeal. There's a *bright, alert look* about Metalseal packages that comes directly from Dobeckmun's long experience with special laminations. And the *strong, lively quality* of Dobeckmun printing on this combination of aluminum foil and paper is a tremendous selling asset. To make the customer reach for *your* product and open it in perfect condition, consult Dobeckmun about box overwraps of Metalseal.

The Dobeckmun Company,
A Division of The Dow Chemical Company,
Cleveland 1, Ohio • Berkeley 10, California
Offices in most principal cities

ABSOLUTELY ACCURATE 2 VALVE FILLER

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The Perfect Filler for Glass, Plastic and Tin containers. Accurate Ingredient Fill for Aerosol Packing

The Elgin "Twin" is a rapid, faultless producer. This Filler features a unique method for controlling the piston stroke, resulting in two speeds: high-speed on cylinder filling, low-speed on container filling. Easily adapted to a broad range of products and container sizes, the Elgin "Twin" insures an accuracy of fill you can rely on for either liquid or viscous products. Easily cleaned —ideal for light or heavy packs and ideal for aerosol packing—the Elgin "Twin" earns its way in labor and product savings!

PACKAGING MACHINERY MANUFACTURERS INSTITUTE PMMI MEMBER

Write for complete literature Address Dept. E-84

ELGIN MANUFACTURING COMPANY

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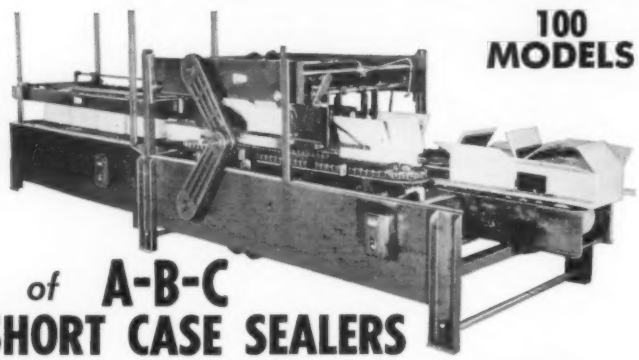
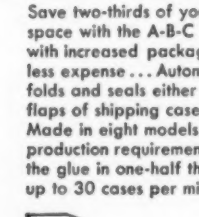


100 MODELS of A-B-C SHORT CASE SEALERS

Save two-thirds of your valuable floor space with the A-B-C Short Case Sealer—with increased packaging efficiency, more speed, less expense . . . Automatically glues, folds and seals either or both top and bottom flaps of shipping cases in one operation. Made in eight models to fit any production requirement. Hot air heaters dry the glue in one-half the time. Speeds up to 30 cases per minute.

TOP QUALITY CASE HANDLING EQUIPMENT

Whatever your packaging job, A-B-C has a production proved machine for you—case sealers, unloaders and unscramblers, side sealers, and hand gluers.



WRITE NOW FOR DETAILS AND FLOOR PLANS

A-B-C PACKAGING MACHINE CORP. TARPON SPRINGS, FLORIDA

Letters to PACKAGE engineering

Re: Fibre container, metal bottom

Gentlemen:

We have been looking for some time without success for a fiber container with a metal bottom. The closure is to be the screw type with a metal ring crimped to the top. On the side of the ring there are 6 evenly spaced lugs which permits the closure to be locked with about one-eighth turn. This container is to be used for packaging tablets in a polyethylene bag and must have about a 1 gallon capacity.

We would appreciate it very much if you could tell us who makes this type container.

Packaging supervisor
of a drug company

We invite readers who can answer this query to write us — and we'll send the replies to this packaging supervisor.

Re: Articles in previous issues

Gentlemen:

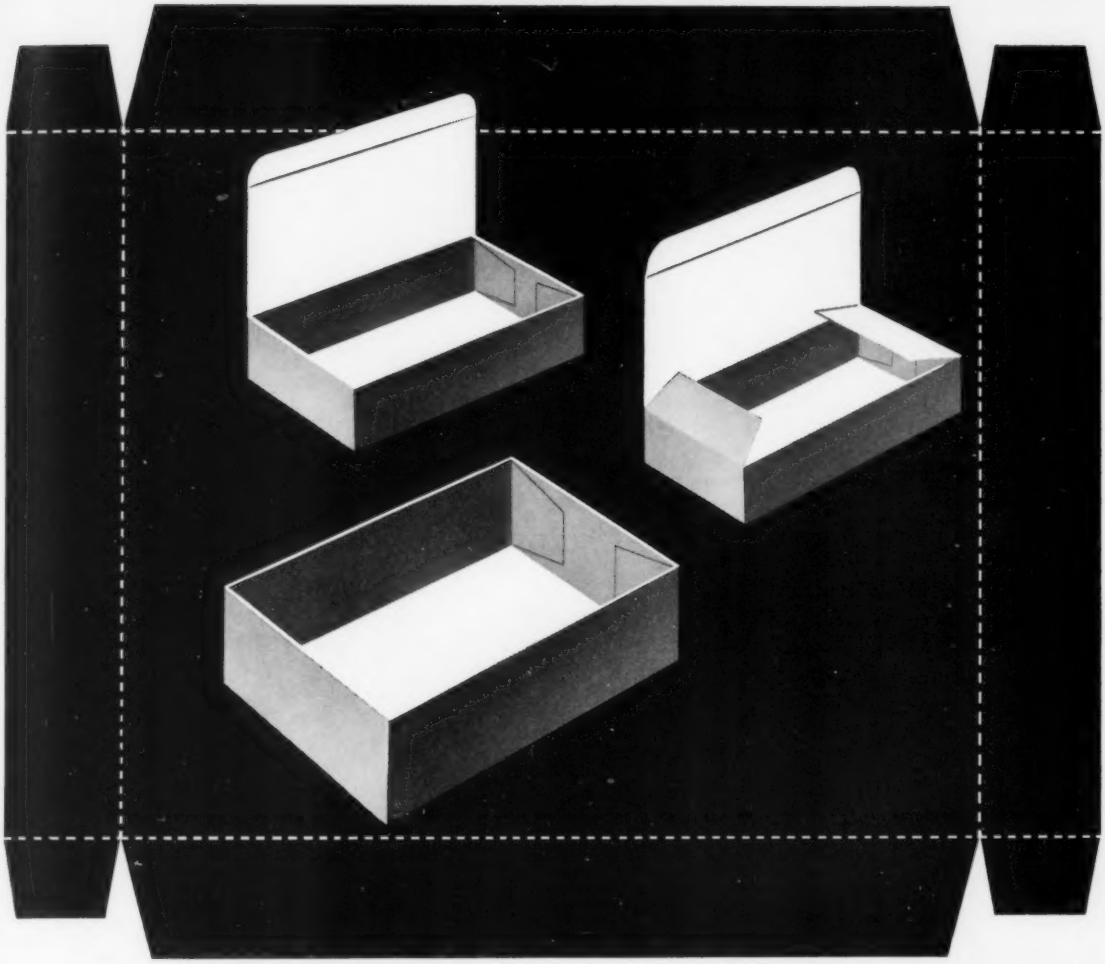
I would appreciate it very much if you would send me a reprint of the article by Barney Hilton entitled, "Moisture vapor transfer study results in new theory." This appeared on page 28 of your February, 1957, issue.

H. D. Brown
Research Coordinator
The National Potato Chip Institute, Inc.
Cleveland

Gentlemen:

In your good publication sometime during the latter half of 1957 you published an article titled, "Maintaining net weights through quality control." Unfortunately, we are not certain of the exact date of the issue involved.

In any event, we would very



High-Speed PACKAGE Model PA-S Forms

UP TO 210 CARTONS A MINUTE

New speed . . . new efficiency . . . new ease of operation. You get them all in the Package PA-S continuous motion carton former that has been designed to meet today's demand for high-speed, cost-cutting operation.

With speeds up to 210 cartons a minute, the PA-S is completely automatic. It uses rotary feeding of flat, die-cut blanks that require 85% less storage space than pre-formed cartons. Perfect registration of printed blanks, both ends and sides, is assured by specially-designed mandrels and forming plates. A new gravure-type wheel provides accurate control of glue film for stronger, more firmly glued cartons. Two glue pots handle hot or cold adhesives, are readily removable to make the PA-S easier to clean and handle. Adjustments for size changes are quicker than any machine of its type.

For full information on the high-speed Model PA-S or standard Model PA carton forming machines, call your Package representative today.

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PACKAGE

PMMI

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NEW forward-design ROLACODER

See it at the PACKAGING SHOW . . . Booth 1205, New York Coliseum, May 24-30

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Holds enough ink for a week!

- Extra compact—adaptable to any conveyor, case-sealer, etc.
- Simplified construction—for trouble-free performance
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- Swing-out mounting for easier maintenance
- Patented "Metalok®" type base holds type more securely, makes copy changing easier

Write today for full details about the new "Series 300 Rolacoder" case-marking attachment

First and foremost in automatic production-line CODING, MARKING and IMPRINTING machines

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wrap-ade

HIGH SPEED UNIT PACKAGER

Shown is only one of many Wrap-Ade Unit Packagers. Other models available for packaging:

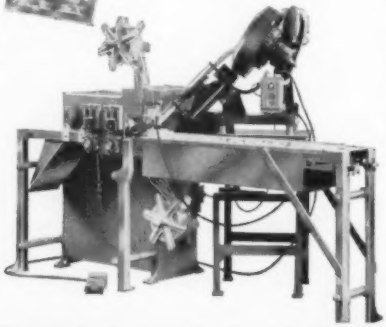
- LIQUIDS
- POWDERS
- TABLETS
- SOFT GOODS
- FOOD PRODUCTS
- HARDWARE

or any reasonably flat small product

Send us a sample of your product today for our prompt quotation.

This Wrap-Ade Unit Packager was selected by an ELECTRICAL PARTS MANUFACTURER to speed production and cut costs.

Sample Package: Wall Plate Assembly



wrap-ade MACHINE CO., INC.

Celebrating a Quarter Century of Progress in Packaging

83 VALLEY STREET, BELLEVILLE 9, NEW JERSEY

PHONE—PLYMOUTH 9-6150

Letters to PACKAGE engineering

(*Continued from Page 6*)

much like to have a tearsheet of this article, if that is possible.

M. R. Sullivan
The Howe Scale Co.
San Francisco

Gentlemen:

I would appreciate your advising me if it would be possible for me to secure a copy of your March, 1957, issue. I am interested in the article on the subject of adhesives which appeared in that issue.

H. C. Scott
Eastern Regional Representative
Packaging Research Division
Owens-Illinois
New York City

Gentlemen:

Please send two reprints of the article, "Taking a 'new look' at our odor, flavor transfer problems," from the January, 1958, issue.

Howard B. Brown
Development Engineer
Central Fibre Products Co.
Quincy, Illinois

Gentlemen:

I should appreciate a reprint of Dr. Peterson's article dealing with packaging developments for the food industry, which was published in your December, 1957, issue.

Miss F. Misiak
Research Librarian
Canada Packers Ltd.
Toronto

We have sent you with our compliments the article each of you requested. As long as our supply lasts, we are happy to furnish individual copies of specific articles. Merely write us on your letterhead. Be sure to identify the article you want—either by author and title or by month and page.

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On guard against the profit squeeze? Too much product protection? Too little? Too many interruptions on automated packaging lines? Gaylord men can help you check these points — and more. They have developed a special skill in scoring packaging successes with corrugated . . . against the toughest challenges.

Whether you need regular cartons by the thousands or engineered packaging, call your nearby Gaylord man.

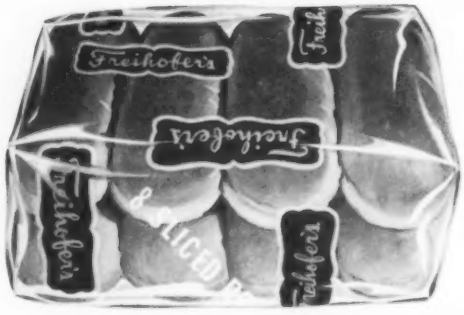
GAYLORD
CONTAINER CORPORATION

Gaylord Boxes

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

DIVISION OF **Crown Zellerbach Corporation**

MOISTURE CONTROL



The packages shown on this page were produced by Avisco cellophane converters: Pie by Pie Pack, Hoboken, N. J.; Bacon by Daniels Mfg. Co., Rhinelander, Wisc.; Rolls by Diaphane Corp., Philadelphia, Pa.; Potato Chips by Package Products Co., Charlotte, N. C.; Mints by The Dobeckmun Co., Cleveland, Ohio. It's smart to do business with a creative converter. Write us for the name of one near you.

AVISCO

. . . you get it only with CELLOPHANE

So many packagers these days insist on cellophane for perishables. There's a good sound reason for this. Cellophane is the one film that is coated for moisture control. (Vary the coating and you vary the moistureproofness.) And, as every successful packager knows, moisture control is a key to optimum shelf life. For example . . .

Some products call for low moistureproofness. Take pies. Too much moisture makes them soggy. AVISCO P-1 cellophane is uncoated, lets moisture escape fast, keeps pie crusts crisp.

Some products call for intermediate moistureproofness. Bacon, for instance. AVISCO DSB cellophane has a special lacquer coating that lets moisture escape gradually, keeps bacon from molding.

Some products call for standard moistureproofness. Consider frankfurter rolls. Loss of moisture makes them stale. AVISCO MS cellophane has a full lacquer coating that holds in moisture, keeps rolls fresh.

Some products call for high moistureproofness. Like potato chips. Moisture makes them soggy. AVISCO RS-1 cellophane has a polymer-resin coating that keeps moisture out. This keeps potato chips crisp and fresh.

Some products call for superior moistureproofness. Butter mints, to be exact. Moisture ruins them. Two plies of AVISCO MS cellophane (held together with a wax laminant) keeps moisture out. Cellophane can be laminated to other flexible materials, too, for superb moisture barrier performance.

If you'd like to know more about these and other AVISCO films, write for our free booklet. Or, better still, call your Avisco salesman or converter representative.

AVISCO® CELLOPHANE

AMERICAN VISCOSE CORPORATION

Film Division, 1617 Pennsylvania Blvd., Philadelphia 3, Pa.

FREEZE IT...

OR BOIL IT!

New "Scotchpak" Heat-Sealable Polyester Film withstands -70° to 240°F temperatures

3M Research Laboratories now give you a clear-as-glass packaging film designed especially for the food industry—a film with a combination of properties unlike any other film on the market.

This new "Scotchpak" Film resists freezing cold (down to -70° F) and boiling heat (up to 240°F!)—yet can be heat sealed at 275° to 400°F. with only 20-60 psi in 0.2-2.0 seconds. It blocks ultra-violet rays—gives longer shelf life to all food products.

"Scotchpak" is *tough* and has higher seal strength than any other film. It can be easily handled on conventional bag making and filling equipment. Still, "Scotchpak" is priced competitively with existing so-called "boil-in-the-pack" films. It is available in a 2 mil thickness in rolls up to 50 inches wide, ready for printing —if you desire.

For complete facts and figures on this dramatic new food packaging development, write 3M, Dept. LY-48, St. Paul 6, Minn. Do it *today!*

TRADEMARK

SCOTCHPAK BRAND **Polyester Film**

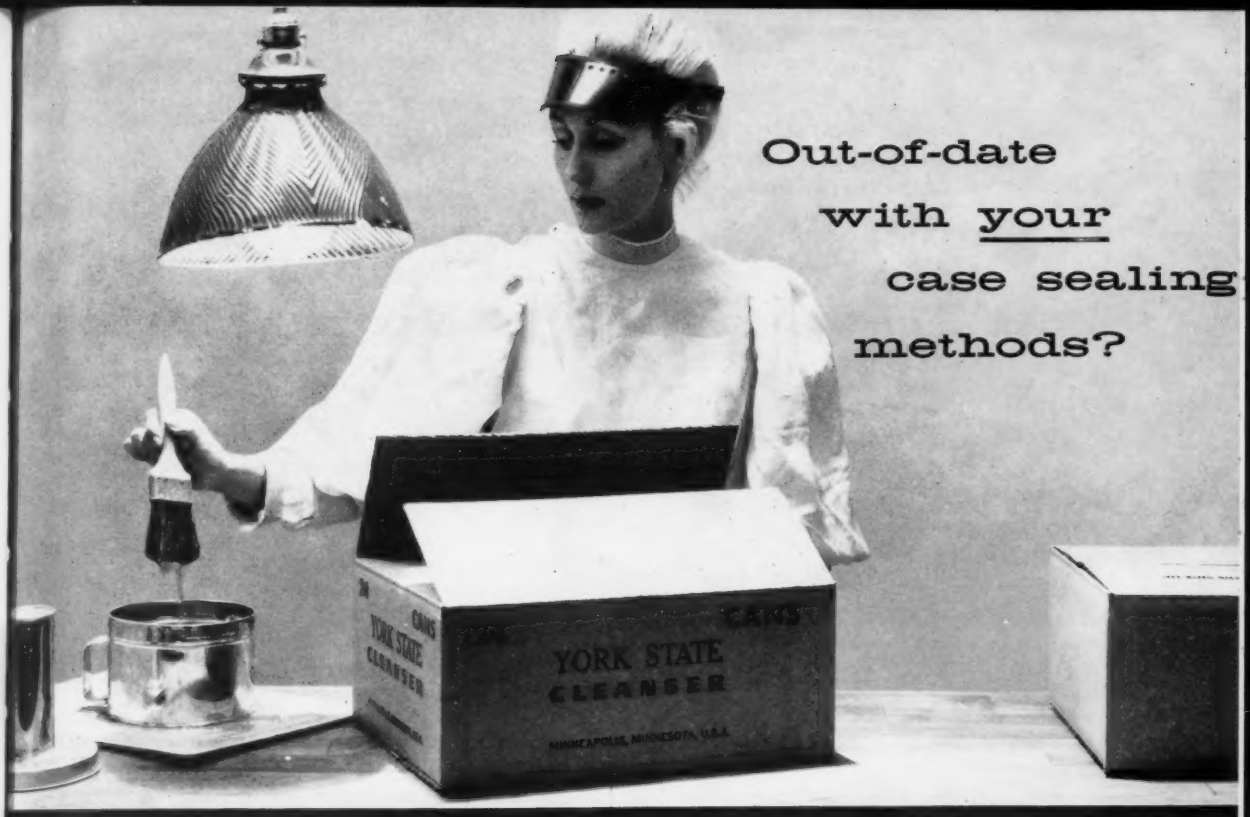
MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

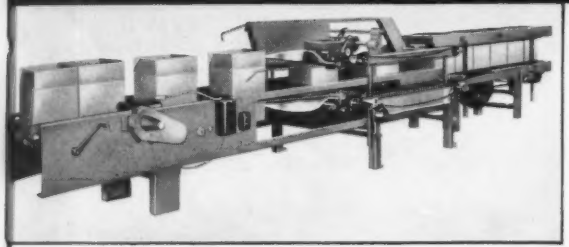
3M COMPANY

For more information circle No. 212 on Reader Service Card

For more information circle No. 213 on Card



Out-of-date with your case sealing methods?



PACKOMATIC FULLY-AUTOMATIC CASE SEALER

Loaded shipping containers IN, sealed cases OUT—and no operator needed! It aligns corrugated cases, positions flaps, glues, seals and discharges fully-automatically. Packomatic was first with this production-proved machine. It's available in a wide range of case sizes for installation on your present line. Semi-automatic, too.

J. L. FERGUSON CO. Joliet 1, Ill.

New York, Chicago, Cleveland, Boston, Tampa, Baltimore, Portland, Denver, Los Angeles, San Francisco, Seattle, New Orleans, Louisville, Kansas City and All Principal Canadian Cities.

PACKOMATIC machines include the Bale Sealer — Case Sealers — Opener-Loaders — Case Imprinters — Telescoping Volumetric Filler — Packer-Gluers. Units available, semi-automatic or fully-automatic depending on your needs.

Packomatic

T.M. Reg. U. S. Pat. Off.

equipment feeds, forms, positions, loads, seals, and imprints shipping containers automatically

Fully-automatic Packomatic Custom-Engineered machines go all the way—or any part of the way—with your packaging operations. Modernize your present line with a fully-automatic case sealer—or really put it into high gear with a Packomatic that feeds, forms, and positions shipping containers, end-loads them with cans or cartons at top speed, then discharges them sealed and imprinted, ready for shipment. Most important, only one part-time operator is needed for the whole operation. Labor costs are obviously reduced. End-loading techniques shrink paper board costs up to 28% and your whole output takes a sharp climb. Packomatics can save time and money. Let us show you.

Six 5-qt. cans or gallon cans in 20⅛" x 13⅜" x 9 1 3/16" case

Twelve 46 oz. cans in 21" x 13" x 7⅛" case

Twenty-four cartons in 15½" x 10⅝" x 8½" case

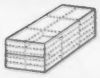
Eighteen 7 & 8 oz. cartons in 20" x 14⅛" x 8⅛" case

Sixty cigarette cartons
King Size: 17⅞" x 11½" x 22"
Regular: 14 1 3/16" x 11½" x 22"

TYPICAL CASE LOADING PATTERNS FOR CANS AND CARTONS

Twenty-four 12 oz. cans in 16⅜" x 10 15/16" x 5 5/16" case

Six No. 10 cans in 22 1/16" x 17⅜" x 7⅛" case

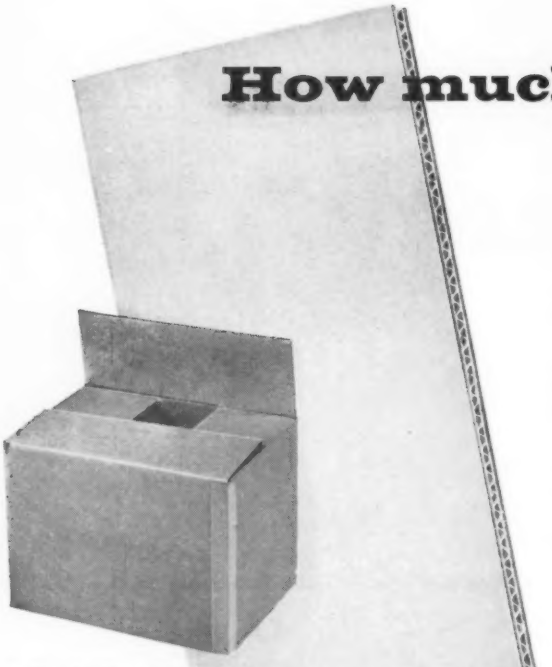


Thirty 1 lb. cartons in 16⅛" x 10 9/16" x 7¼" case

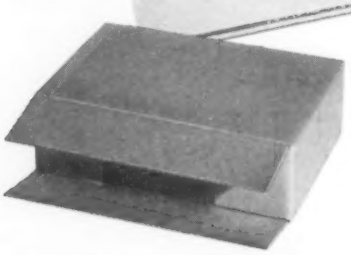
Twenty-four cartons in 19½" x 10⅞" x 7" case

Forty-eight cartons in 22¾" x 23½" x 15⅞" case

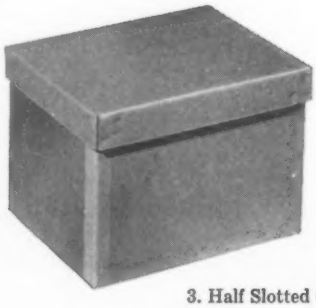
How much tailoring does



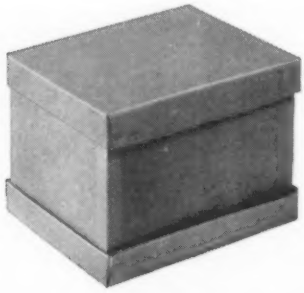
1. Regular Slotted Container



2. Special Flap Slotted Container



3. Half Slotted Container



4. Double Cover Box

Picking the proper corrugated shipping carton is like buying a suit. Rarely will a ready-made, "off-the-shelf" unit fit perfectly. Some modifications usually are needed; possibly even a complete custom-built job. It all depends on your product and how it is normally handled and shipped.

You may find, for example, among the representative basic box types shown here one that's just right for you. Or perhaps further structural design work would enable you to ship more efficiently and economically.

Talk it over with your local Union Box representative. He's an expert at pin-pointing all the pertinent factors. And at recommending or helping develop the most practical box for your needs.

1. Regular Slotted Container

Probably the most popular type used today. Fits all standard automatic packing and sealing units. All flaps the same length; outer flaps meet in center. Single- or double-wall construction is used, depending on degree of

about types of Union Boxes

your shipping container need?

protection your product needs.

Similar to the "Regular Slotted" is the "Center Special Slotted Container". Top and bottom areas are stronger; both inner and outer flaps meet at box center.

2. Special Flap Slotted Container

There are two kinds of "Special Flap" boxes. In one, the top and bottom flaps partially overlap. In the other (shown left) they overlap completely, providing double thickness at top and bottom. When strapped shut, flaps override each other, form snug, non-butting closure. If glued, adhesive covers full flap, assures extra safe, durable bond.

3. Half Slotted Container

Bottom is similar to Regular Slotted Container. Flanged cover is sent as a blank for set-up by shipper. Good as combination shipping shelf package. Without cover, used for batteries, other heavy, small items. Also, as a transfer file or stock box.

4. Double Cover Box

Ship heavy items where strapping is necessary? This three-piece box with telescoping covers might be just the ticket. Excellent stacking strength; strong covers take rough handling. Often used in large sizes for bulk packs on pallets.

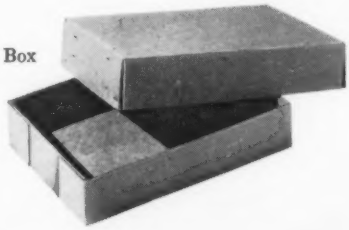
5. Telescope Box

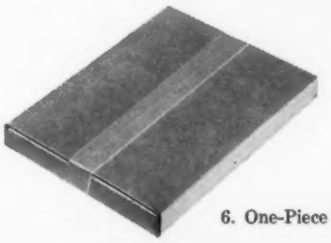
You'll probably need a box like this if you ship flat items such as paper, books, advertising material, etc. It protects with a double build-up of sheet around sidewalls and corners which also gives you maximum stacking strength. May be constructed as a full telescope (see below) or as a partial telescope.

6. One-Piece Folder

Another excellent shipper for books, catalogs, etc. Packs and closes quickly and easily. Mostly used for parcel post and express shipments. Also made up as "One-Piece Special Folder" where all flaps meet in center.

5. Telescope Box





6. One-Piece Folder

Write for new, informative booklet, "Types of Corrugated Boxes."

union camp

UNION BOXES

UNION BAG-CAMP PAPER Corporation

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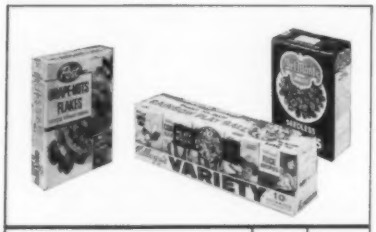
Western Division—4545 W. Palmer, Chicago, Ill.

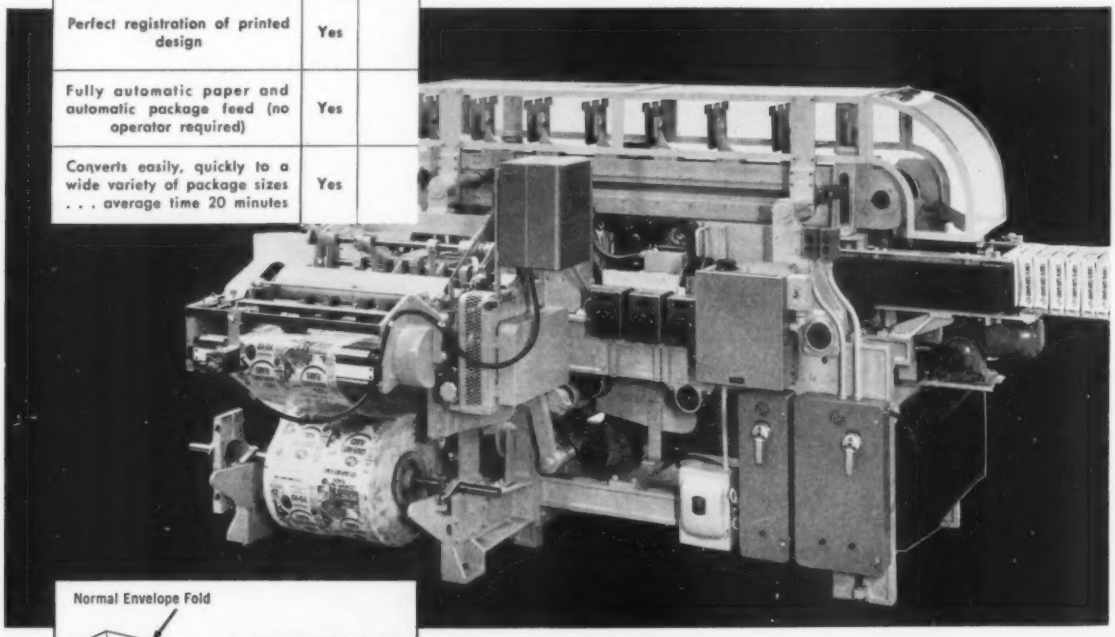
Model 56-G... eliminates scuffing, marring, dulling of display panels ...clean tight overwraps boost sales

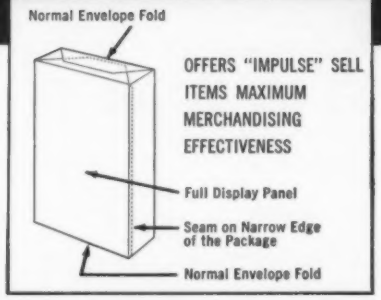


FEATURES	Model 56-G	Any Other Machine
Seam on the narrow edge of the package makes tighter more protective wrap	Yes	
Lifetime sealed bearings for trouble-free operation	Yes	
Package entry from side saves floor space	Yes	
Perfect registration of printed design	Yes	
Fully automatic paper and automatic package feed (no operator required)	Yes	
Converts easily, quickly to a wide variety of package sizes . . . average time 20 minutes	Yes	

A compact, highly efficient, tested machine overwrapping at speeds up to 100 per minute

The Model 56-G is a well-engineered machine . . . simply designed . . . ruggedly constructed . . . has a modern up-to-date appearance and precision wraps at sustained high speeds in the famous "Continuous Flow" manner. The display faces of the overwrapped article are clean, clear, neat . . . unmarred by heat or scratching because of the machine's ability to place the seam on the narrow edge of the package while retaining normal envelope folds at the ends. The result is eye appeal, and display dominance of the package are at that peak effectiveness so necessary for successful selling in today's modern supermarkets. The size range provides for a multitude of packing sizes, easily handling items from 5" to 15" long, from 2½" to 8¼" wide on the broad panel and from 1" to 5" deep. The average changeover time is about 20 minutes. Basically the Model 56G is built for handling self-sealing cellophane, but optional equipment (refrigerated plates) may be installed for quickly withdrawing heat from laminated foils, wax coated papers or similar heat sealing papers.




Normal Envelope Fold
OFFERS "IMPULSE" SELL ITEMS MAXIMUM MERCHANDISING EFFECTIVENESS
Full Display Panel
Seam on Narrow Edge of the Package
Normal Envelope Fold

"Continuous Flow" Packaging

BATTLE CREEK
packaging machines, inc.
100 TWELFTH STREET, BATTLE CREEK, MICHIGAN

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Or, would you prefer *CROSSETT BLEACHED BOARD* tailored to your requirements? Our customers enjoy the benefits of a custom production concept in board purchasing.

Instead of confining their ideas and adapting their printing and production equipment to a limited range of standard board, they let Crossett tailor to their exact fit a food board that combines all the desired properties.

The complete flexibility of our modern cylinder machine allows us to build a board that places long and short fibre pulps at a specific place in the sheet. Printing surface, strength, folding properties are determined by your need almost without compromise.

Crossett is not selling bleached board alone. We sell technical know-how combined with package engineering service, and machine time to produce your needs. The production time you require is assured in all markets on regular schedule.

May we tell you the full story and show you samples?

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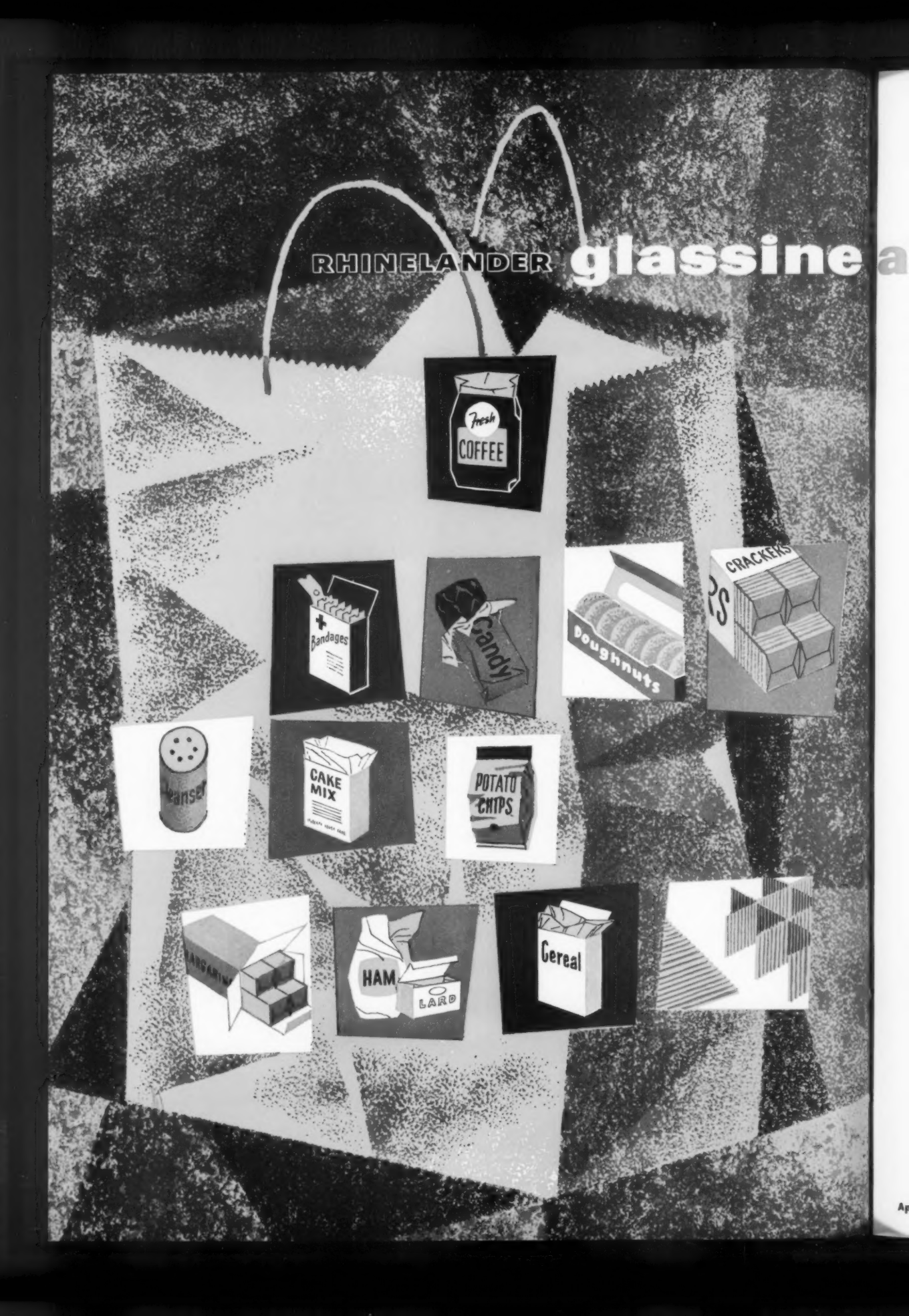
RHINELANDER glassine
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Bandages
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e and greaseproof papers

Here are versatile papers that economically provide basic protection essential to good packaging . . . foods in wide variety, pharmaceuticals, and industrial products . . . from cereals to tea . . . bandages to piston rings.

For example, the nickel still buys a lot of candy bar . . . but the low retail price demands packaging calculated to the fraction of a cent. Rhinelander Glassines and Greaseproofs, widely used, provide efficient low-cost protection, attractiveness and merchandising appeal, with good printability and trouble-free operation in high-speed automatic packaging.

Inherent barrier properties of Glassine and Greaseproof papers make them ideal for diverse packaging chores.

"Work Horse" Protective Packaging Materials that do so many jobs so well . . . at so low a cost

LOOK AND EVALUATE!

1. Greaseproofness
2. Oil and fat resistance
3. Vapor and odor resistance
4. High tensile strength
5. Wide range of basis weights
6. High gloss and smooth finish (Glassine)
7. Transparency, opacity, variety of colors
8. High density
9. An excellent coating base and printing surface
10. High ratio of mullen to basis weight
11. Compatibility with other packaging materials
12. Approved wet-strength properties

The built-in characteristics differentiating Glassine and Greaseproof from other papers may be enhanced by conversion. Coating, waxing, laminated combinations . . . and the addition of extra properties . . . heatseal, water-vapor resistance, gloss and release properties.

Glassine and Greaseproof are truly remarkable papers . . . available in standard grades or tailor-made to exacting requirements.

AMONG THE MANY APPLICATIONS FOR GLASSINE AND GREASEPROOF . . .

Carton liners and dividers
Bags and bag liners
Package overwraps
Board lining
Unit packaging
Carton inner wraps
Canister and fiber tube laminations
Candy and cookie cups
Retail food service wrap
Package accessories and labels
Corrugation

Write for samples and full information stating application or requirement.

RHINELANDER PAPER

Rhinelander Paper Company • Rhinelander, Wisconsin

Subsidiary of St. Regis Paper Company

Packaging is more than "Skin Deep"!

PACKAGING PROBLEM:

Carnation Company, Los Angeles, is a producer of an "Instant Hot Cocoa Mix" which is used institutionally by operations such as soda fountains, restaurants, schools, hospitals, drive-ins, etc. Until recently, this product was packaged in a conventional pillow pouch produced by Western-Waxide. What Carnation desired was a package that would offer a convenience to the user; preferably speed his opening of the package. Close portion control was another requirement.

Increased Sales . . . by Design!

SOLUTION:

Western-Waxide's Package Research and Development Laboratory went to work on the problem. It was already known that Crown Pouch 2508 was the proper material to protect the hygroscopic product. This material is 25# pouch paper laminated with 7# polyethylene to .00035" aluminum foil and coated on the inside (foil side) with 15# polyethylene. One of Western-Waxide's employees came up with the idea that made this the newest thing in flexible packaging. Why not put a tear string in the pouch? It was done, after considerable experimentation, by introducing a thread to the material during the final polyethylene operation. When the pouch is formed on the user's machinery, the string lies in the fold that is the unsealed side of the three seal fin pouch. The two ends of the tear string are sealed into the sides so that they will not pull loose when the pouch is opened. The user of the product simply tears up on the corner of the pouch and the string neatly cuts paper, foil and poly right across the top of the package.

(NOTE: In actual use it has been found that the C-Zip pouch may be formed, filled and sealed on the most critical machinery with no loss of speed. Other applications in addition to unit packaging of hygroscopics are under development. The C-Zip pouch is exclusive with Western-Waxide. Patents are applied for.)

For a demonstration, information and sample of the tear string C-Zip pouch, visit booth F at the Packaging Machinery & Materials Exposition, Atlantic City, March 25-28

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Headquarters Office: 2101 Williams St., San Leandro, Calif. • Plants and Sales Service Offices in Principal Cities of the United States

Manufacturers and converters of plain and printed waxed paper • foil • foil laminates • polyethylene coated paper and polyfilm laminates • films • bags • pouches and other specialized flexible packaging materials (C-Zip: Trademark, Crown Zellerbach)

Visit us in booth 1224, AMA Packaging Show, New York City, May 26-30.

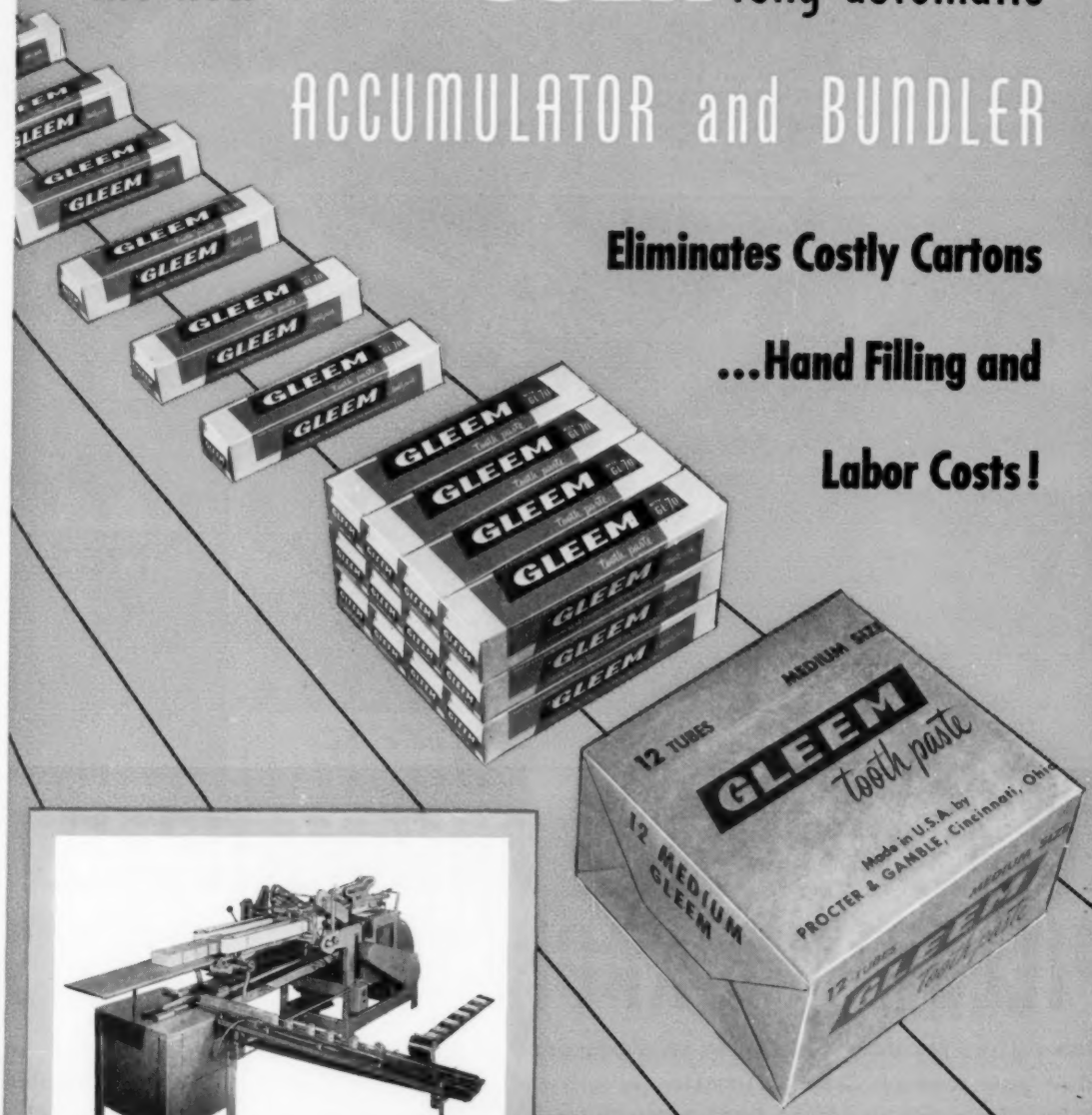
the new HAYSSEN fully automatic

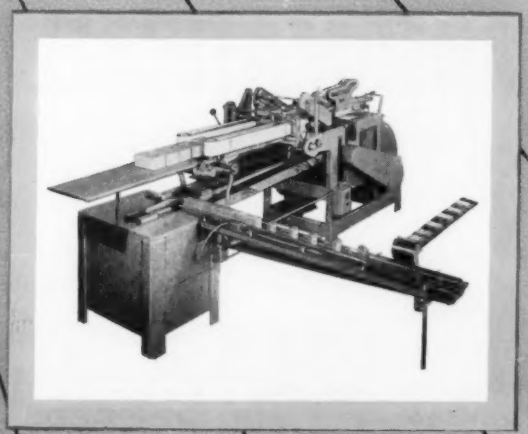
ACCUMULATOR and BUNDLER

Eliminates Costly Cartons

...Hand Filling and

Labor Costs!





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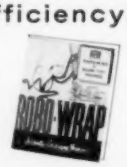
FORM, FILL, SEAL AUTOMATICALLY

PILLOW-PACKAGING CUTS COSTS

Does your product belong in this picture? It does if automatic packaging can save you money. Doesn't matter whether you package solids, powders, granules or liquids . . . Robo-Wrap heat seals them in a single or double wall of cellophane, paper, polyethylene, Foil Laminates, Mylar or Saran. Hand-over-hand method forms, fills and seals packages from a continuous roll for highest efficiency. Robo-Wrap changes package size quickly, too. Write for booklet that gives facts on low maintenance and higher efficiency.



LYNCH ROBO
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A Subsidiary of
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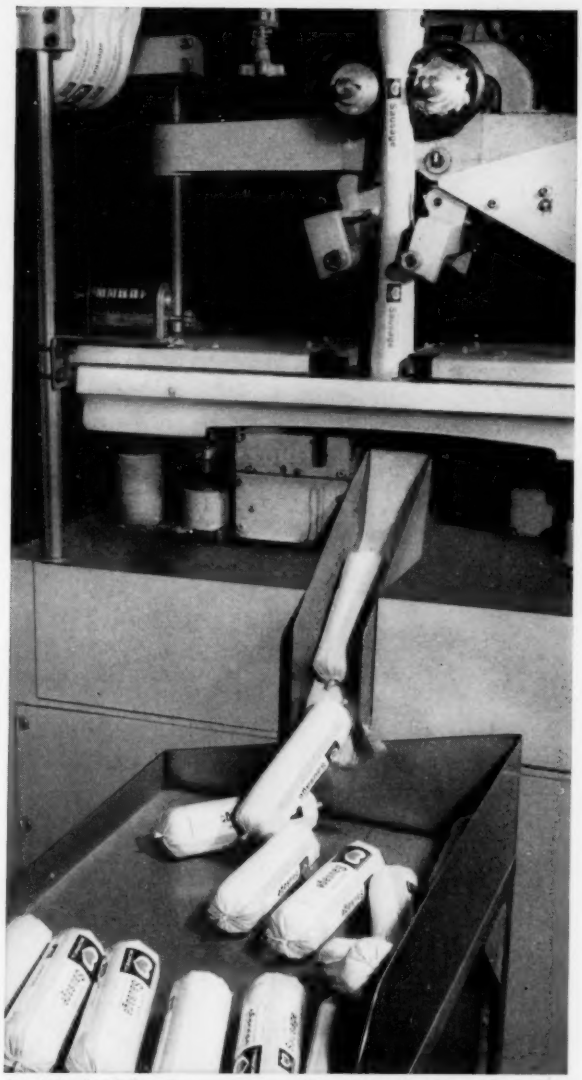
now... fresh pork sausage automatically packaged in polyethylene film



Printed polyethylene film passes through this machine which heat-seals it to form a tube, stuffs it with a pound of sausage and clips the ends—all at a top rate of 1500 packages per hour. Sausage packaged by John Morrell & Co., Ottumwa, Iowa.

It's right, it's fast, and it's saving money . . . pork sausage, automatically packaged in a tube of polyethylene film, is packed and closed as fast as 1500 units per hour. And, the estimated per package savings average one cent!

The film made of BAKELITE Brand Polyethylene lets oxygen in, gases out—perfect for fresh pork sausage. Printability and toughness equip the film for self-service and increased sales.

Film made of BAKELITE Brand Polyethylene costs less than any other transparent packaging film. For more good reasons for using it to beat the profit squeeze, write Dept. BP-157.

It pays to package in BAKELITE BRAND PLASTICS

UNION CARBIDE

BAKELITE COMPANY, *Division of Union Carbide Corporation,* 30 East 42nd Street, New York 17, N. Y.

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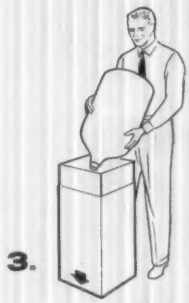

New shipping box for battery acid...

Corrosive liquids ship safely, economically in easy-to-handle polyethylene bottle and H & D corrugated box. Lightweight unit fills and dispenses quickly without opening box. For your packaging problem, better see H & D.

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Division of West Virginia Pulp and Paper Company

Authority on Packaging • Sandusky, Ohio • 42 Sales Offices • 15 Factories

Thomas Flanagan is a graduate of Seton Hall University with a B.S. degree in chemistry. He has also undertaken graduate study at New York University. Prior to joining National Starch Products as a development chemist four years ago, he was associated with the Metasep Division of Nopco Chemical Company doing research work on metallic soaps. His current responsibilities at National's research and development laboratories include supervision of the group doing development and servicing of hot melt adhesives.

Faster setting adhesives boost production line speeds

By THOMAS FLANAGAN, Group Supervisor, Research and Development Laboratories, Adhesive Division, National Starch Products, Inc., Plainfield, New Jersey.

Here is a review of the intricacies of thermoplastic hot melts and a discussion of their particular value in high-speed packaging. Explaining the mechanics of adhesive setting and the limitations of various currently used adhesives, Mr. Flanagan looks to the hot melts as a key to fast setting. His discussion of how these adhesives bond in a split second should enhance the understanding of those concerned with adhesion at packaging line speeds.

The status of our packaging industry today is one of constant alertness, searching for easier and more economical methods of manufacture. Frequently, greater production is considered to be the answer. In order to obtain this increased output, such things as faster machines and automatic operations are being used. In addition to the need for increased productivity from available plant area, industrial expansion also requires that a prime consideration be given to the more effective utilization of floor space. This is reflected in more compact equipment. All these production modifications require corresponding alterations in the component materials of the operation.

Abundance of new materials. In addition to these changes, we have the advances of industry in the realm of new materials. New containers, films, and packaging forms also require alterations in related components such as adhesives. In many cases, modification in standard adhesives is insufficient to handle the newer surfaces, and entirely new adhesives are required. The necessary direction for adhesives to take in accommodating the faster production speeds is to faster setting. In adjusting to the challenge of speed set forth by the packaging industry, it is necessary that we review the fundamental types of adhesives, and discuss the changes that are taking place.

Mechanism Of Adhesive Setting

Practically all liquid adhesives consist of solid bonding material carried in a fluid vehicle. These products set through the release of their vehicles permitting the solids to form the bond:

(a) Vegetable adhesives, such as dextrin types, set and form a bond by loss of water. When the solid concentration is increased by this water loss, the cohesive strength of the dextrin is adequate to make the bond. The percentage of water which must be removed will vary with different types of dextrin adhesives.

(b) Resin emulsions and latices are stable dispersions of the adhesive solids in water. They set and form a bond when enough water is removed to cause the dispersion to break. Thus, this relatively fast setting adhesive forms a bond when the solids are increased (by absorption of the water vehicle) to approximately 70 per cent. Thus, with an adhesive of 50 per cent solids content, loss of less than half of the water content is all that is needed for setting.

(c) Lacquers are similar to vegetable adhesives in that the vehicle must be removed until the cohesive strength is adequate to hold the surfaces being adhered. The solu-

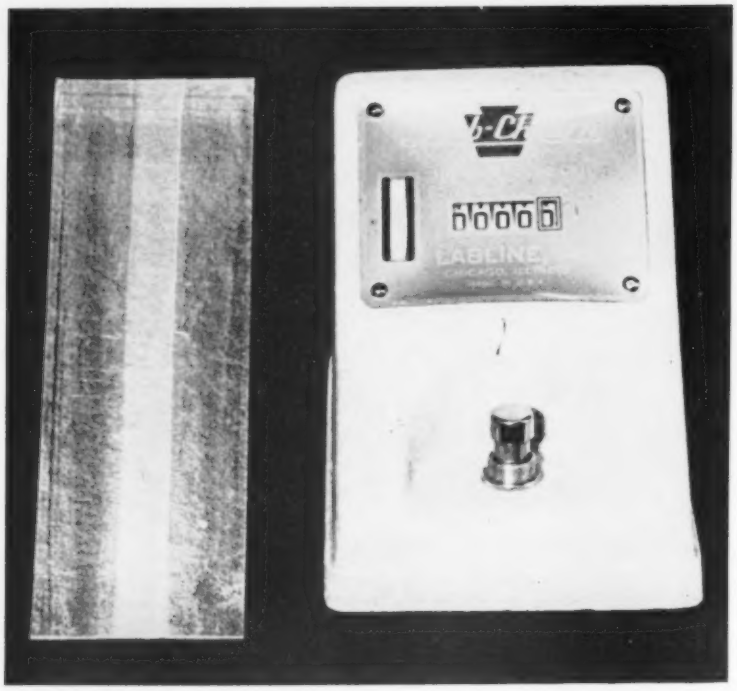


Fig. 1. At 0.0 sec., a strip of hot melt adhesive on the foil side of a piece of foil-lined fibreboard is kept molten by a heat lamp.

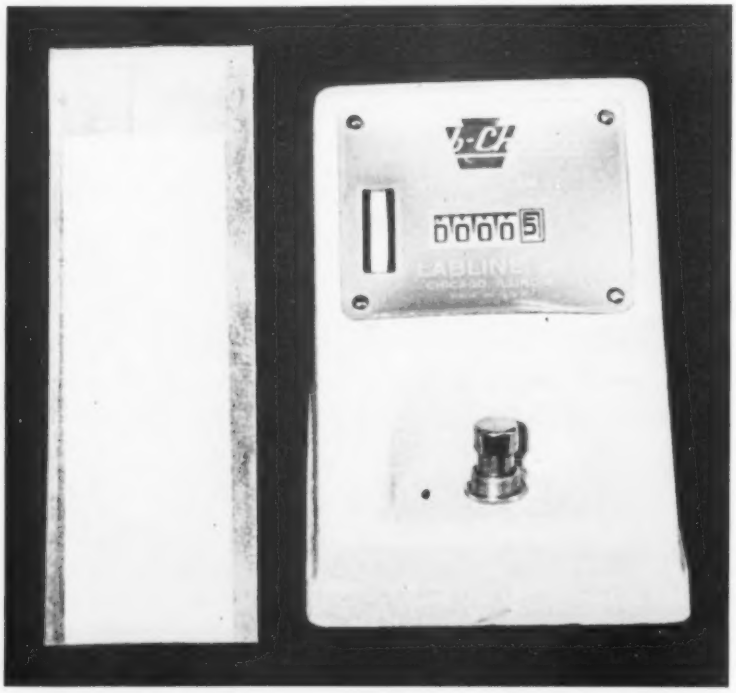


Fig. 2. At 0.5 sec., a bond is made with a second piece of the same board (foil side to the adhesive).

tion must lose practically all of its solvent before the adhesive is tough enough to make a bond. Any residual solvent in this drying operation acts as a plasticizer, softening and lowering the strength of the adhesive.

(d) Animal glue adhesives set both by loss of water and by cooling. This type of product is a solid jell at room temperature and must be heated to approximately 140°F. for liquification. On cooling, it reverts to the jell state with its inherent tack. In many packaging applications, the temperature setting effect is more important than water-loss setting, but the ultimate bond strength is not reached until almost all of the water is removed.

Industrial Factors Influencing Variations In Setting Speed

The above types of adhesives, having to lose some or almost all of their vehicles to make a bond, are dependent to a certain extent on the materials to be bonded. Soaking wet paper, for instance, cannot be bonded by an adhesive which requires the removal of water to effect the bond. There is just no place for the water to go.

Similarly, but to a reasonable extent, the following factors exert an influence on the removal of a vehicle from an adhesive:

(a) Moisture content of the stock as made.

(b) Variations in moisture content of the stock during storage.

(c) Humidity and room temperature variations at point of adhesive application.

Moisture presents difficulties. The effect of variable moisture content in the stock to be bonded is, of course, greater in the case of vegetable adhesives than with resin emulsions. On the other hand, in the winter months, when plant humidity is very low (unless humidification is used to maintain the proper moisture content in the stock), moisture will be absorbed much more readily. This changes the adhesive's setting characteristics. In extreme cases, where the stock becomes "bone dry", it actu-

ally reverts to a water-repellent state. The problem is obvious. Close control of these factors, then, is a more or less rigid requirement for the uniform operation of these types of adhesives.

Variations in density, porosity, and absorbency of stocks are also an important consideration in the functioning of these adhesives. A change in the direction of a more dense stock means a greater obstruction or resistance to the passage of the vehicle which must be removed to effect the bond.

A common variation in stock today is a surface coating or treatment for improved printing qualities or some other improvement. In many cases, this coating acts as a barrier to the removal of vehicles. Often, it presents a new surface more difficult to adhere with the standard adhesives which have a limited affinity for such coatings.

Limitations With Vegetable Adhesives

This type is ordinarily considered the slowest setting of the water-containing adhesives because most of the water must be removed before a bond is made. Vegetable adhesives for all practical purposes are water-soluble. The solids have a distinct affinity for the water. The relative difficulty in removing this "bound" water accounts for the slowness in setting.

Need a porous surface. At least one porous surface must be used to permit the vehicle to leave the bond area. Vegetable adhesives are generally limited in adhesion due to the nature of the polymer involved. Water resistance is generally low and they must be protected against the possibility of bacterial action.

Vegetable adhesives are nonthermoplastic and, therefore, heat sealing is not a possibility.

Limitations With Lacquers

The characteristics of lacquers are similar to vegetable adhesives to the extent that the solution must be concentrated, by loss of solvent, to a very high solids content before an actual bond is formed. Absorption does not necessarily remove the solvent vehicle from the bond area, but could hold it to act as a plasticizer. This is desirable from a penetration standpoint, but as for speed of setting, it is a drawback. Board fibres do not have any affinity for solvent—as they do for water.

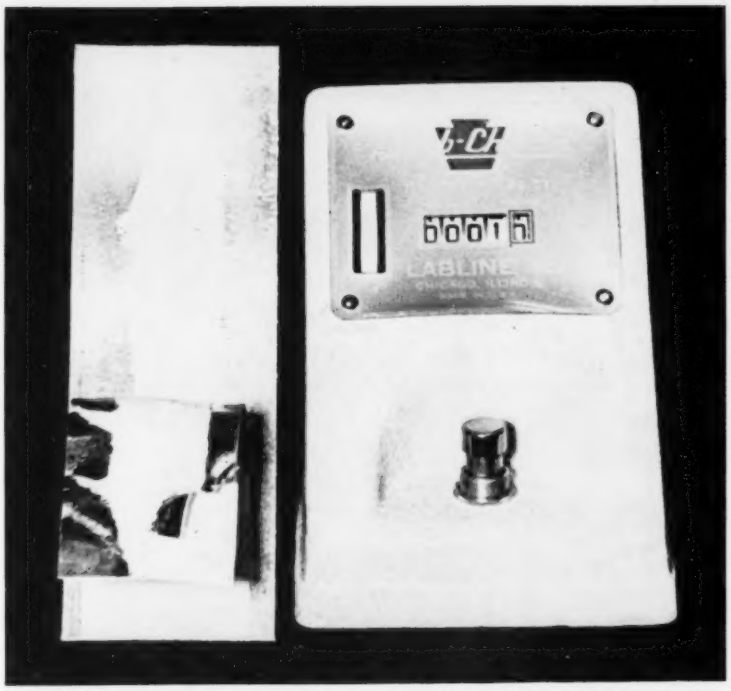


Fig. 3. At 1.0 sec., a bond is made sufficiently strong enough so as to tear the foil from the fibreboard to which it had been laminated.

Evaporation of solvent. Therefore, the board does not aid in the removal of the vehicle as it does with aqueous systems. Thus, solvent removal is obtained mainly by evaporation. This removal of solvents creates special problems productionwise. The flammability hazard is the most pronounced difficulty involved. Some solvents are very toxic and removal of their vapors requires extra equipment over the application pots, rolls, etc. Lacquers also have a pronounced tendency to string or "cotton" in many machine applications.

Solvent is usually the major ingredient in lacquers, and unless extensive solvent-recovery units are employed, solvent loss increases costs.

Limitations With Animal Glue Adhesives

Since the setting characteristics of animal glue are dependent largely on the jelling effect, which occurs in cooling from an application temperature of approximately 140° F. to room temperature, the setting speed may be affected adversely during hot summer months. The final setting speed will also be retarded by high humidity and stock with a higher moisture content. These adhesives are limited to nonwater-resistant applications because animal glue is water-soluble.

Odor difficulties. In addition, many grades of animal glues have noticeably higher odor levels than other packaging adhesives and should not be used where odor may cause a problem. In general, higher preservative concentrations are required with these protinaceous materials to avoid bacterial action. They are used best on machines where application is by a direct roller-coater, as objectionable webbing or stringing may be encountered on systems involving stencil or transfer rollers, etc.

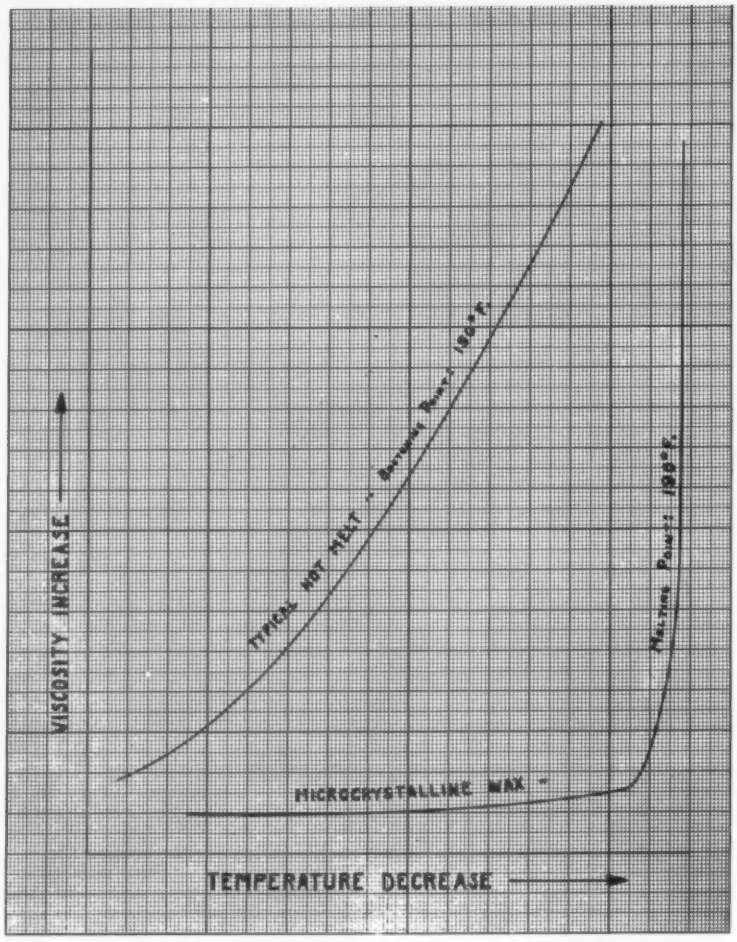


Fig. 4. The relative comparison between viscosities of hot melt adhesives and waxes as temperature changes. Note the immediate thickening or viscosity increase of hot melts as temperature decreases, in contrast to the relatively constant viscosity of waxes.

Improvement In Setting Speed By Using Resin Emulsions

Synthetic resin emulsions are inherently faster-setting adhesives because the water-insoluble polymer can make and maintain a bond before most of the water is absorbed or evaporated. A bond can be made while the adhesive is still wet, in contrast to the vegetable and lacquer systems which must be practically dry to effect setting.

Water readily released. Also important is the fact that water in the emulsion is not particularly attracted by the resin droplets and is therefore released more readily. With resin emulsions, a tough, flexible, high-molecular-weight adhesive material can be applied from the inexpensive, safe, and easily handled water medium. They are usually thermoplastic and permit the advantages of heat sealing without the drawbacks of a solvent system. Difficult water-resistant stocks are handled easily by the more versatile resin emulsion. A much wider range of adhesive properties is available, and greater water-resistance is possible, but water must still be removed before a bond is formed.

Summing Up The Limitations

In addition to the specific limiting properties and the affecting factors outside the adhesive, we have seen that the previously discussed adhesive types all have a common denominator involved in the setting speed. It is, of course, due to the fact that the vehicle which carries the adhesive material must be removed before a bond is made effectively.

What Can Be Done

Progress in the direction of faster speeds poses the questions: Can we eliminate these factors limiting the setting speed of adhesive? Can we circumvent the factor of vehicle removal? Can we minimize the industrial factors influencing the setting speed? Obviously, several of the variables can be eliminated by closely controlling plant temperature and humidity. Rigid specifications on board and paper characteristics would also help.

Sets by cooling. In many cases these steps are not feasible, and the answer can be found in the use of a hot melt type adhesive. The hot melt is a solid thermoplastic which has no vehicle and sets only by cooling. The effect of the industrial variations such as moisture content and porosity of stock is greatly minimized because the penetration of the stock by a vehicle is no longer involved.

What Are Hot Melts?

Hot melts are 100 per cent solid material. This is *all adhesive*. There is no loss of material in applying or effecting a bond when using a hot melt adhesive. The adhesive is melted down by the application of heat until it is a molten liquid. It is applied in this liquid state and the second surface to be bonded is joined to it immediately while the adhesive is still molten. Cooling alone causes the molten liquid to resolidify and effect the bond. It can be seen that the only change necessary to make a bond is a change in temperature.

From liquid to solid. In forming a bond, hot melts usually have a definite transition from liquid to solid, as opposed to the jell formation of animal glues. With hot melts, we are operating at higher

temperature levels and out of the range where a high room temperature can affect the setting speed, as it does in the case of animal glues. While the latter types contain water and are controlled somewhat in their setting by humidity variations, hot melts being water-insoluble remain unaffected by such changes.

Split-second setting. Instead of talking about minutes to make a bond, we are now in the realm of having the adhesive set within seconds and fractions of a second.

The sequence of photographs, Figs. 1-3, demonstrates the extremely fast setting characteristics of hot melt adhesives. Note that in one second, a bond was made sufficiently strong enough so as to tear the foil away from the fibreboard to which it had been laminated. This sequence was accomplished by using a heat lamp to keep the adhesive strip on the foil surface molten until the bond was formed. A timer was included in the accompanying illustrations only to show pictorially that hot melt adhesives can bond such impervious surfaces as foil to foil in a very short interval of time.

In addition to making direct bonds in such short time intervals, a common technique is to apply a hot melt as a non-blocking coating, which, being thermoplastic, permits reactivation or heat sealing. Heat sealing in itself is a possibility, of course, with emulsions and lacquers, but with hot melts we can combine and take advantage of the speed of hot melt coating and the speed of heat sealing.

How Hot Melts Compare With Wax And Asphalt

Strictly speaking, wax and asphalt would fit in under the above definition. However, they differ from hot melts as discussed here in that they are relatively low-molecular-weight materials with low viscosities and sharp, well defined melting points typical of crystalline material. In contrast, conventional resin hot melts have a softening range over the transition from solid to liquid. This is caused by the presence of high-molecular-weight polymeric material which contributes the toughness and specific adhesion lacking in wax and asphalt. The graph in Fig. 4 demonstrates polymeric materials used in hot melts. On the other hand, waxes not containing toughening polymer remain fluid until the solidification point is reached.

Further Advantages Of Resin Hot Melt Adhesives

As a rule, this type of product is water-insoluble and unaffected by moisture or high humidities. Frequently, this factor is used to advantage with the hot melt functioning as a moisture barrier as well as being an adhesive.

No vehicle. Because there is no volatile vehicle to be removed in forming a bond with this type of adhesive, non-porous and impervious surfaces can be bonded. A wide range of adhesive properties can be formulated to handle the variety of combinations this type makes possible.

Characteristics And Requirements For Use

(1) The polymeric constituent in resin hot melts exerts a controlling influence on the viscosity of the adhesive as we do not have a volatile solvent or water to act as a vehicle. However, there is a limit to the viscosity which can be handled without resorting to extremely high temperatures which would degrade the hot melt. This results in a corresponding limit in the toughness of the adhesive that is possible with this type, although in the great majority of packaging applications the toughness is clearly adequate.

(2) In comparison to the more common adhesives, relatively high temperatures are required in equipment. This varies from approximately 200°F. to 350°F. A source of heat is not the only requirement, for it must be applied uniformly for proper functioning. In this regard, rather special equipment is needed to handle hot melts since in many cases standard application equipment cannot be converted. In designing this equipment, there are two key factors:

First, all machine parts coming in contact with the adhesive must be heated to prevent premature setting; second, close temperature control must be exercised. If there are so called "hot" spots, localized overheating and subsequent degradation will result over a period of time. In addition, since the flow properties are a function of temperature, the machining and transfer characteristics will be affected by deviation from the correct temperature.

Look at machine design. Astute machine design is necessary to take full advantage of the speed and other properties hot melt thermoplastics have to offer. This has been demonstrated most dramatically by the newer machines utilizing hot melts.

A few of the fields which are taking or are starting to take advantage of hot melt adhesives are can labeling, bag lip seals and side seams, foil and paper heat seal coatings, and the latest carton sealing operations.

Conclusions

We have seen that vegetable and lacquer adhesives are naturally slow drying and require porous stocks to remove the vehicle. Among other things, vegetable adhesives lack water resistance and are limited in adhesion. Lacquers require rather elaborate equipment, are difficult to handle, are costly, and can entail certain hazards.

Resin emulsions present an improvement in all of the above considerations with the exception of still requiring porous stocks for the removal of a volatile vehicle.

Further advancement is obtained with resin hot melts over and above resin emulsions. They are naturally fast setting and are not dependent on porous stock because no volatile vehicle is lost. 100 per cent adhesive is applied and 100 per cent

(*Continued on Page 72*)

Charles F. Schokmiller is a graduate of Washington University in mechanical engineering. He is a registered professional engineer in Missouri. Prior to joining Grove Laboratories, he devoted seven years to type foundry and utilities fields in machine design and development, and he spent four years as a sales engineer in the mill supply industry. Prior to becoming manager of manufacturing at Grove, he worked in maintenance engineering and was production manager and plant manager. Mr. Schokmiller is a member of Packaging Institute and the Engineers Club of St. Louis.

Making a new packaging line fit into an existing plant

By C. F. Schokmiller,
Manager, Manufacturing Department,
Grove Laboratories, Inc.,
St. Louis

Here is a packaging operation that required not only a new packaging line, but also a plant-within-the-plant for the preparatory capsule filling work. In reviewing the installation, Mr. Schokmiller stresses the importance of the details of such difficult packaging operations as inserting cotton into open vials and enumerates basic techniques of running the line. He also points up the importance of adhering to plant standards, of fitting the new operation into the established scheme of production—and explains how the plant surpassed its own standards for the new line. His observations merit the attention of those concerned with fitting a new packaging line into any existing plant.

When our company decided to produce Citroid in capsule form, we had to develop a new manufacturing and packaging operation. In effect, we put a packaging plant within a packaging plant. This entailed building a controlled room within the plant in order to house our capsule production and filling equipment. Also we had to dovetail the main packaging line for Citroid into our existing pattern of operations and had to make it conform to our established packaging standards.

Controlling the atmosphere. Converting our estimated sales volume into machine and production capacities, we figured the number of square feet necessary for our capsule operation and built a room having controlled temperature and humidity—in effect, a vapor-proof structure. We found that control equipment, including air conditioning, dehumidifying, and dust control machinery, located just outside this room took up nearly as much space as the room itself. We provided a system of exhausts and vacuum take-away units, including a dust collector at each machine. Our basic idea was to pick up any dust as close to its source as possible.

We installed six Lilly capsulating machines, four inspection and polishing tables, and one Hartnett marking unit. Since this represented our first experience with capsule filling, we worked out a comprehensive training program. We decided to have Lilly representatives train our people on the equipment installed here, rather than send them to the Lilly plant itself.

Training The Trainers

Our standard practice is to have an operator trainer teach all operators the proper method for performing production operations. This trainer is, of course, properly trained in what we feel is the best method for each operation. By use of this plant trainer we are assured that all operators are trained uniformly. We found too much variation in the results when the girls were trained by other girls or by their immediate supervisor. Because this operation was entirely new our trainers were taught, in this particular instance, by Lilly representatives. Our trainers in turn taught our machine operators.

As the training was taking place our mechanics had a chance to learn machine details and our set-up men learned the operations required for this particular type of operation. The inherent characteristics of the capsule filling machine require adjustments from time to time to meet stated volume and most important, maintain uniform weight control. Weight control in the Citroid product is maintained in particularly close limits to meet

federal regulatory requirements.

Varying the adjustments. Even though a machine would be filling the same lot number of material, it was found that ring feed or auger feed speeds would have to be varied on different machines in order to meet the exacting weight requirements. A major step in the training of operators was to teach them how to get correct fills by varying the adjustments on the equipment. Our operators had no difficulty in acquiring the ability to adjust their machines in order to perform properly. These adjustments are simple lever changes and are not to be confused with more serious mechanical adjustments which are, of course, performed by our set-up men.

Packaging Critical Products

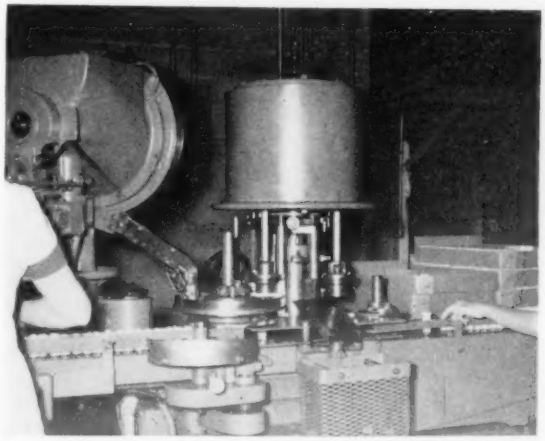
Gelatin and powder are extremely critical. We maintain close controls of humidity, temperature, dust control, and filtering because these items handle much more effectively within prescribed controls. Once our capsules are filled, sealed, and marked, they go into sealed drums. They are held in vapor-seal drums prior to further inspection and release by quality control and their transfer to our packaging line for filling into vials.

We insist on close control of capsule labeling and inspection based on standard practices. Proper identification is extremely important. We maintain a system of double-checking—not only by the operators on the machines, but also by supervisors.

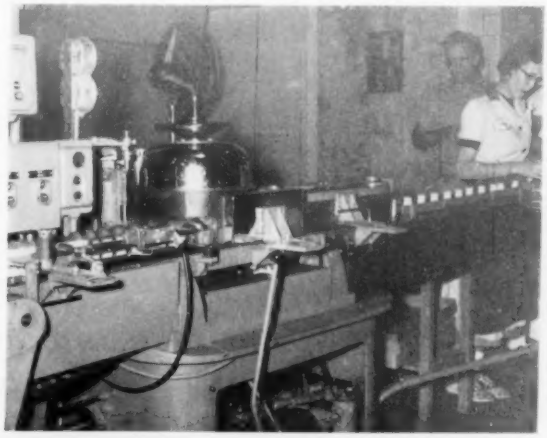
Our management's decision to put capsules into straight-sided vials rather than into neck bottles posed a difficult problem with our packaging operation. Since we wanted to use this line for other products in addition to Citroid, we installed two (rather than one) Lakso fillers on the line.

Avoid capsule separation. Our machinery is basically standard except that we changed the feed plate on one Lakso filler in order to avoid separation of capsules. When members of a capsule sep-

Cottoning of vials is difficult because vials have no necks to restrain inserted cotton. Pending development of a mechanical cotton tamper, Grove uses an additional operator to tamp cotton. Protruding cotton acts as a wick.



Because plugs must enter vials accurately, Grove developed special vial holders and chucks that enter plug caps accurately into vials. Close tolerance between plugs and vials makes accurate centering necessary.



To handle two sizes of vials on this line, there is a worm-feed on the labeler so that it may handle both sizes. Otherwise the labeling operation is standard, after which vials move to the cartoning sequence.

Manual insertion of a folded postcard in each carton is a temporary addition to the packaging line. Grove usually uses such cards while a product is new in order to sample consumer reaction.

Rollers leading to the case sealer are powered. Cases of this product are so light that a gravity feed is not adequate. Use of live rollers assures movement of cases to the sealer at normal production speed.

arate, the contents spill on the machinery and have an effect like that of sand. It retards the even flow of capsules, impairs the operation, blocks our machinery, and mars the appearance of capsules as they are being filled.

Having a second Lakso filler alongside the first one illustrates our use of a single line for several products. Further, all our equipment must be adjustable for two sizes of Citroid, five-gram and ten-gram vials.

Difficulties Of Cottoning

We found that cottoning of vials is a particularly difficult operation. The problem results in the fact that a straight-side vial has no neck to restrain the cotton once it is inserted, as in the case of a bottle. As a result the cotton tends to spring up and out of the vial upon being filled. Experimentation with different kinds of material led us to settle on a 90-grain rayon viscous coiler material.

The next phase in the completion of the line will be to develop a mechanical method of solving the cottoning process. We are, at the moment, studying two possible solutions. One is to develop a method to use cotton balls, which seem to stay in place much better, or to develop an additional mechanical tamper for this coiled material. This does not seem an insurmountable problem.

Cotton as a wick. Temporarily we are assuring ourselves that the cotton is properly tamped in by the use of an additional operator. It is important enough to use this operator in order that we avoid letting any cotton protrude between top of vial and the cap. Cotton so protruding from the finished package can act as a wick. Aside from very poor appearance, this cotton wick is bad functionally because it tends to permit moisture to enter the package.

We feel the cottoning problem is the bottle-neck of the line at the moment. The use of cotton balls or a mechanical tamper will free one operator from the line. Our ultimate goal, dependent on production requirements, is a high speed six-head cottoner, which would then permit at least a 50 per cent increase in production without additional personnel being required.

Accuracy Of Capping

In our capping operation, it is necessary that vials are accurately centered. The plug must go in just right—in effect a registered position. If this accuracy of insertion is not maintained, vials may break. To overcome this difficulty, we developed special vial holders and chucks that center the plug cap accurately into the vial. The accurate center of the plug into the vial is necessary because of the close tolerance between the two parts. Application of screw caps to a bottle permits quite a latitude in the centering because of the design of CT closures.

The insertion of the plug into the vial is essentially merely a straight pushing operation after proper centering. We found, however, in actual operation that the plug caps could be inserted much better when the chuck was spinning rather than stationary.

For labeling we have a New Jersey unit equipped with a worm-feed to handle both sizes of vials. Otherwise the operation is stand-

ard. After labeling, the vials move into a Jones cartoner.

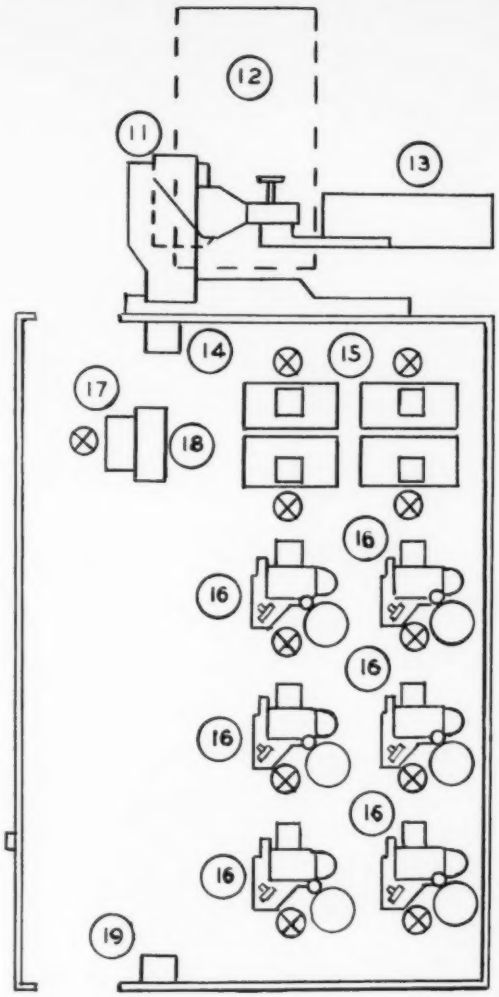
Cartoning and casing. Temporarily we have installed an additional operation as a phase of the cartoning work. This involves the manual insertion of a folded postcard in each carton. The purpose of these is to sample consumer reaction. We usually enclose cards within cartons while a product is new. Once vials are cartoned, they are packed in display cartons, which in turn go into corrugated boxes for movement through our Standard-Knapp adjustable case sealer.

Cases of this product are so light that a gravity feed is not adequate. Therefore, we have powered the rollers leading to the case sealer. By using these live rollers, our cases move through the sealer at normal production speed, even though unusually light. Leaving the sealer, they go into the warehouse and are palletized pending final release by the laboratory. In effect our product goes into bond before being released to shipping.

Operating The Line

To accomplish our basic packaging operation we have one attendant at the Lakso filler, one at the cottoner, one at the capper and labeler, two inserting mailing cards, and two girls packing cartons and cases. A floor-boy keeps materials supplied to the line and helps out where needed—as in the case loading operation. The girl who is temporarily tamping cotton will be supplanted by our mechanical tamper as soon as this equipment can be completed.

Keep machinery close together. A special feature of our packaging line is the close positioning of and coordination between machines. We have a minimum of conveyor distance connecting the various components of the line. Further, the line does not stop for individual machines. Therefore, we have provided build-up or accumulation points along it to furnish supplies of product in case of temporary stoppages. Having minimum con-



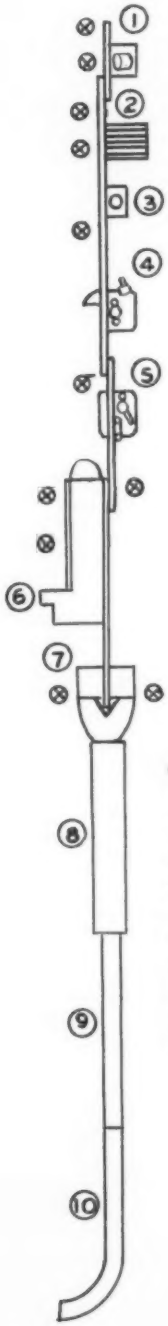
LEGEND

⊗	MACHINE OPERATOR
11	AIR CONDITIONING UNIT
12	DUST COLLECTOR
13	KATHABAR DEHUMIDIFIER UNIT
14	SUPPLY CABINET
15	CAPSULE POLISHING & SORTING TABLE
16	CAPSULE FILLING MACHINES
17	TABLE FOR CAPSULE PRINTING MACHINE
18	CAPSULE PRINTING MACHINE
19	SCALE

This room is in effect a vapor-proof structure equipped with temperature and humidity controls. It contains the capsulating machines, inspection and polishing tables, and marking equipment.

veyor space between machinery is a standard practice of ours.

The shortness of our line created a glue problem at our labeler. Had we been able to furnish a long roller or compression section, there would have been no trouble. However, we have standardized on a resin-base glue, which overcomes the problem inherent in a short and fast labeling and gluing operation.



LEGEND

⊗ MACHINE OPERATOR
1 4 WAY & NO DOZ FILLING MACHINE
2 CITROID CAPSULE FILLING MACHINE (LAKSO)
3 COTTONER
4 CAPPER
5 LABELER
6 CARTONER
7 PACKING TABLE
8 GLUER
9 COMPRESSION UNIT
10 DISCHARGE CONVEYOR TO SHIPPING

Straightline layout of packaging line assures its fitting into confined space. It is standard Grove practice to have minimum conveyor space between units. Build-up or accumulation points along the line provide supplies to keep machinery going in case of temporary stoppages.

Dovetailing With Standards

A major feature of the entire project is the use of machinery and operations so that adjustments are made within the standard times used in our plant. We want both Citroid items to run on regular schedules. In the basic planning of the operation it was necessary to fit the new production into our established standards.

Planning and scheduling must be done to fit in the over-all time. This is necessary so that the change-over men are available when needed. All change-over work in our plant is done on a schedule. Therefore, a line cannot have a set-up man simply at its convenience.

Avoiding machine downtime. As a result, change-overs must coincide not only with the production of a particular line, but also in relation to the production of other lines having change-over requirements. The simple fact is that every unnecessary change-over reduces the amount of available machine time. Therefore, we avoid all unnecessary downtime for such changing over.

In developing our operation, we established target standards based on the layout of the line. We soon got detailed reports on all downtime and developed average standards in accord with the practice used elsewhere in our plant.

Exceeding Our Goals

Our current standard is 3,000 dozen finished vials per day (7-1/2 actual machine hours). This represents 375 dozen per machine hour (8 hour labor). The difference between machine and labor hours is the half hour per day used in coffee breaks, etc. Our standards are based on total labor expended. We find that we can occasionally surpass our standard and on occasion reach 3,300 dozen vials per day.

We think the ability to maintain or surpass standards is primarily a combination of employee attitude, willingness to cooperate, a certain competitive spirit and last, but not

(*Continued on Page 72*)

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Martin S. Peterson is a graduate of Reed College with an A.B. degree and of the University of Nebraska with M.A. and Ph.D. degrees. For 20 years he taught English at the university and for five years edited the agricultural publications of the university's college of agriculture. In 1946 he became technical editor of the Western Regional Research Laboratory of the U. S. Department of Agriculture, and a year later joined the Food and Container Institute. He has written several books and some 35 articles in the fields of literature, history, and food technology. He is a member of Sigma Upsilon, Phi Tau Sigma (food science honorary society), Alpha Gamma Rho, and the Institute of Food Technologists.

Looking at physical principles that explain packaging tests

By Martin S. Peterson,
Chief, Technical Services Office,
Quartermaster Food and Container Institute,
Chicago

At times even the most sophisticated of packaging test specialists must bog down under the jargon of advanced physics. Dr. Peterson's simplified explanations of stress and strain, density, mass, and volume, tensile strength, Young's Modulus, and others, are guideposts to the understanding of more complex material. His review of these physical laws upon which package testing rests should be of particular help to the practical, operational packaging man as he builds up a test structure explaining container performance.

This article reviews some of the relationships that describe the physical nature of some common packaging tests. There must be, among the 35,000 readers of PACKAGE ENGINEERING, enough people who, like me, find the language of advanced physics rough going. They probably crave, as I do on many an occasion, a set of simple principles that will help explain the more complex ones.

A number of the physical laws that underlie packaging tests throw light on how the packaging engineer, working from universal laws of physics, builds up the elaborate and sophisticated test structure that will predict container performance. This is as true in materials testing as in testing the container itself for strength of construction.

The forces of stress and strain when considered in relation to materials are reasonably simple. It is when they are interpreted in complex equations with a multiplicity of symbols that the layman is "snowed." Let us therefore see what can be done to lay down some stepping stones that will lead from complexity toward simplicity.

Stress And Strain

A first consideration might well be the difference between *stress* and *strain*. Stress is the force that deforms or tends to deform a body such as a piece of wood, a metal strip, etc. Strain is the deformation or alteration in dimensions that results from a stress. Stress is measured by the amount of force applied to a measured area. Strain is measured by the amount of deformation or change which occurs in the area under stress as compared to the total dimensions of the body under test.

A simple example would be the indentation (deformation area or strain) caused by a ten-pound disc of iron of known diameter (stress) if placed on a block of wet cement of known dimensions. It can readily be seen that the measurement of strain in even such a simple example of stress-strain relationships can become very complicated.

The density of the cement, the length of time the weight is applied, and the change in the dimensions of the cement block caused by the displacement as well

A TECHNICAL REPORT FROM DU PONT

New process revolutionizes skin packaging

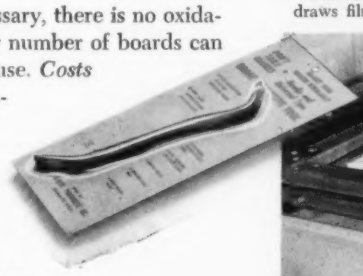
Du Pont ALATHON* polyethylene resin combines with Du Pont MYLAR** polyester film in a new skin packaging film which permits the use of uncoated, unperforated paperboards. Developed by the Print-A-Tube Co., Rochelle Park, N. J., the new film initiates mass usage and automation of the skin packaging process on commercial machinery.

The side of the new film coated with ALATHON 16 is heat-sealed directly to the paperboard, making coating of the board unnecessary. Since the board remains porous, the vacuum is drawn directly through the board, pulling the heated film tightly around the objects being packaged. Dwell time under the heater has been reduced to as little as two seconds and the time for pulling the vacuum to as little as three seconds. A single heat and vacuum cycle with the new film requires an average of ten seconds, compared with 40 seconds, *a saving in time of approximately 75%.*

Shelf life of the film is greatly improved. ALATHON 16 gives the film sealing qualities which are unimpaired with age and protects against moisture transmission. The film may be produced in thin gauges of .001" and .0025", because of its strength. In addition, the clarity of the film and its ability to reflect light are assets in improving package appearance.

Since coated paperboard is now unnecessary, there is no oxidation or discoloration of stored boards. Any number of boards can now be printed and held until ready for use. *Costs are greatly reduced* through the use of uncoated, unperforated boards and the elimination of inventory and waste problems.

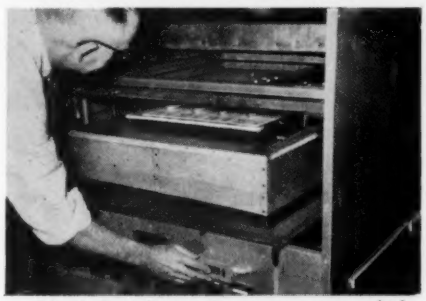
If you would like more information on this and other applications for the versatile family of ALATHON polyethylene resins, just fill in and send the coupon below.



*ALATHON is Du Pont's registered trademark for its polyethylene resins
**MYLAR is Du Pont's registered trademark for its polyester film

• Objects are positioned on paperboard at U. S. Packaging (contract packagers), Chicago, Ill.

• Skin packaging film, developed by Print-A-Tube Co., has been laid a few inches from board.



• Film is heated prior to vacuum process which draws film tightly over objects and against board.

• Finished card shows objects packaged in the tough, sparkling film for O.E.M. Products Co., Chicago, Ill.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept.,
Room 754, Du Pont Building, Wilmington 98, Delaware

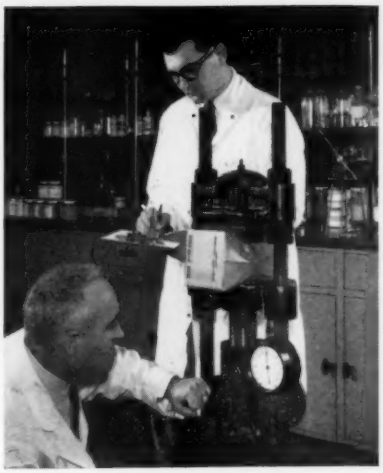
Please send additional property and application data on Du Pont ALATHON polyethylene resins for ☐ skin packaging; ☐ other applications. I am interested in evaluating these materials for_____

*Name*_____ *Position*_____

*Company*_____

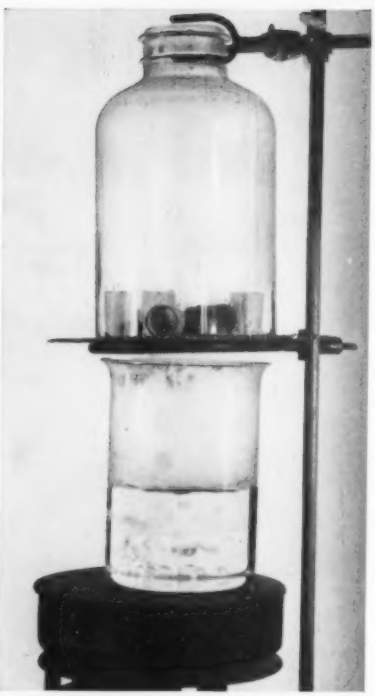
*Street*_____ *City*_____ *State*_____

IN CANADA: Du Pont Company of Canada (1956) Limited, P. O. Box 660, Montreal, Quebec.



210-pound squeeze! Seban AR-2—case-sealing adhesive—withstands extreme pressure. Compression test proves Seban can take almost any amount of palletizing—more than 200 pounds—and still hold, even when the case breaks down. Choose Seban when great bonding strength is important.

Seban will pass your toughest sealing test



36 minutes in live steam! Seban AR-5—tube-winding adhesive—resists both heat and moisture in sterilization of paper tubes for surgical products above. Steam pours into bell jar without delaminating tubes sealed with Seban—not even after 36 minutes. Choose Seban for great resistance to heat and moisture.

In test after test, Seban proves itself capable of meeting almost every packaging situation. Now this new line of polyvinyl resin packaging adhesives from Armour is ready to help you solve your toughest package-sealing problems.

Seban has been proved superior for CARTONS—WINDOW BOXES—CASES—FOLDING CARTONS—TUBES—BAGS—and others. In every instance Seban helps get increased production and better sealing results.

We urge you to have your own laboratory test Seban. Why take chances on an ordinary adhesive doing an ordinary sealing job when Seban has been proved superior?

If you use one of the following machines, a special grade of Seban will help you utilize your equipment to the fullest efficiency.

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Fiber tear within 5 seconds!
Seban AR-1—carton-sealing adhesive—produces a fast, strong bond. Seban holds, the paper fiber tears. This speed test can be confirmed on actual packaging machinery. Seban grabs in less than 5 seconds, produces a good bond in 12 seconds and tears paper completely within 17 seconds. Choose Seban for fast developed tack, strong bonds.

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Problem: How to protect rose plants from drying out in storage and transit.

Preserving bare root rose plants from damage by dehydration proved a problem for growers. Even when stored in moist peat moss, plants would exhaust their available moisture supply.

Crown Zellerbach's research staff called to the rescue, developed a shipping container liner of kraft paper coated with polyethylene.

This new Crown Poly paper liner completely replaced the heavy peat moss giving the roses a "controlled climate" —retaining the plants' moisture yet allowing them to breathe. It keeps the oxygen-carbon dioxide balance at a level perfect for safe shipping yet maintains life-giving moisture. And it is saving money by reducing shipping weight 20 per cent.

This is just another solution by versatile Crown Poly paper. Is there some task Crown Poly paper can do cheaper, faster, or better for you? Write Department PY-1 at the address at right for technical advice.

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as by the compression of the cement as the iron weight sinks—these and other physical phenomena associated with stress-strain relationships create some of the mathematical complexities that can only be described by the calculus.

Getting at the difficulties. The routine tests of the packaging field concern materials that can be given fairly simple dimensions, i. e., length, breadth, and thickness. The qualities to be measured are also reasonably simple—density, hardness, tensile strength, flexural strength, shear strength, rigidity or stiffness, fatigue strength, and so on.

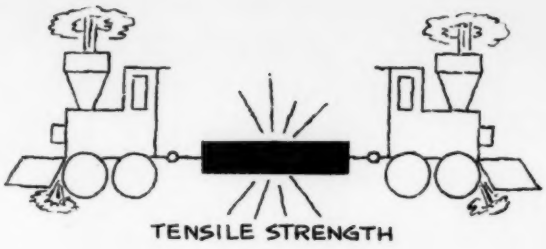
The really tough problems of testing are those that deal with stress effects that cannot readily be expressed in dimensions; for example, certain phenomena in the flow of fluids. However, we are concerned here mainly with the properties of materials and the effects of forces that can be measured. The resulting measurements reveal specific information useful in predicting the performance of packaging materials, the new as well as the old. Thus, the ability of a rigid material to sustain a particular stress, such as sudden impact, under extremely low temperatures (those of Antarctica, for example), may be of crucial importance to a stranded aircrew being supplied from the air.

Simple Physics Of Common Packaging Tests

This brings us to a consideration of the properties that are of concern in testing the strength of materials and the physical laws that are involved in these tests. Let us start with density.

Density. The density of a material is defined as the mass per unit of volume. The formula for determining density is very simple: Density equals mass divided by volume, or D=M/V. Incidentally, an easy way to remember this formula is to note that these symbols follow their normal sequence in the alphabet.

Mass can be found by weighing the material. Volume, considering



only three-dimensional, straight-sided solid bodies, is obtainable by computing: length x breadth x thickness. Thus, since one cubic centimeter of water weighs one gram (at 4°C.), its density is 1. This example was chosen since it demonstrates the convenience of the metric system—namely, the ease of obtaining ratios between density and size. The figure 1 is the ratio of weight to volume. This is a good opportunity to point out that a ratio is an abstraction, and that abstractions are often very useful in designating measures.

Finding the volume. The volumes of materials of irregular dimensions can be determined by dividing the apparent loss of weight of a body, when suspended (as by a handscale) in a liquid, by the density of the liquid. This principle was discovered by Archimedes (250 B.C.), who solved the problem of the purity of gold in the crown made for the King of Syracuse as a result of observing how the water in his bath was displaced as he immersed himself in it.

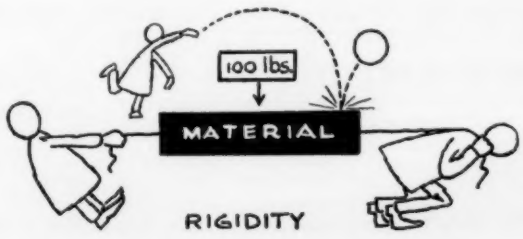
It is known as Archimedes' Principle. He noted that there was an apparent loss of weight of his body while in the water, and that this loss was equal to the weight of water displaced. Applying the density formula, the weight of water displaced (the apparent loss of weight of his body) divided by the density of the water gives the volume of water displaced. It follows, then, that this volume is also the volume of the body.

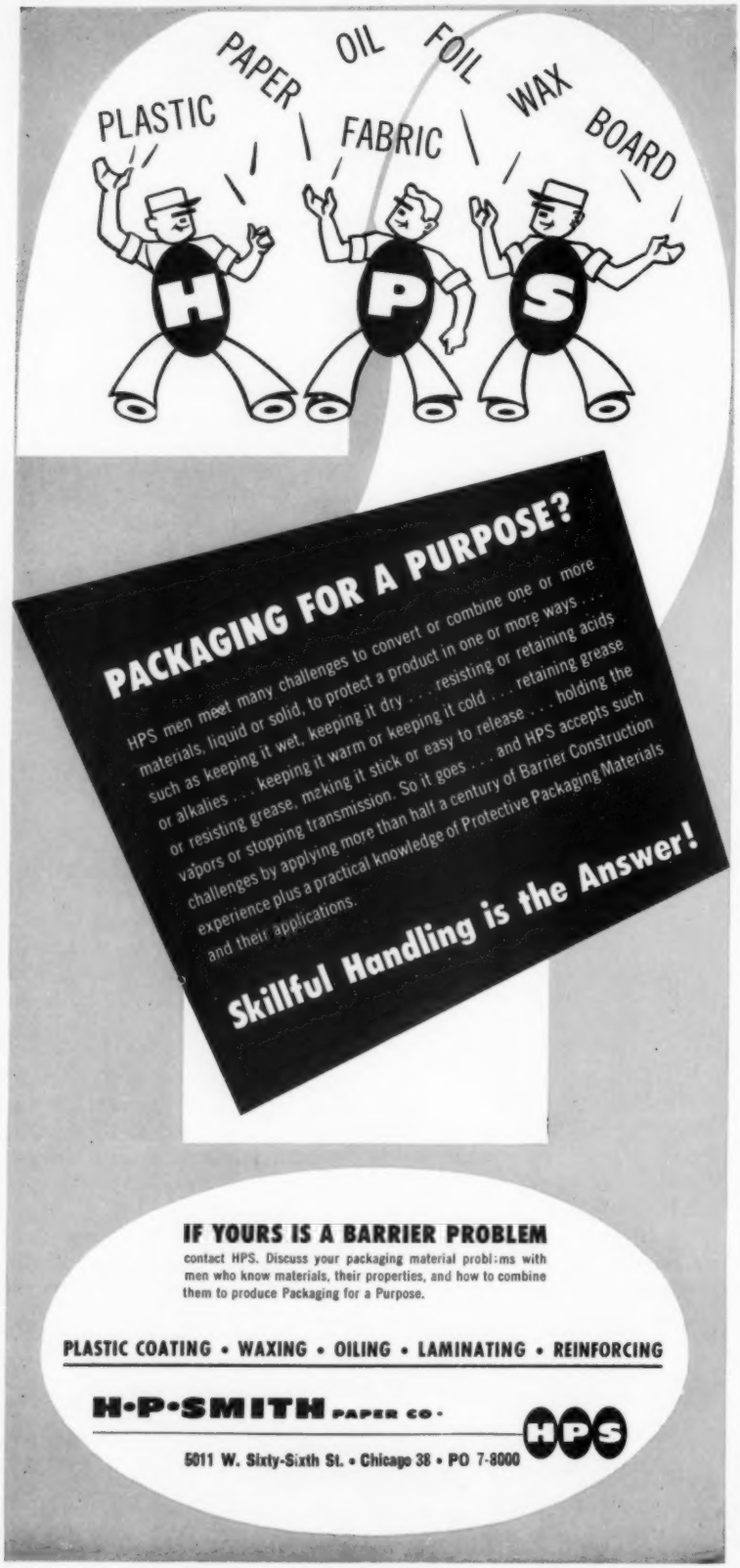
Recognizing the relationship between the displaced water and the size and buoyancy of his body while in the water, he hit upon the formula above, and then went on to solve the problem of the crown. He weighed the crown in air and again while it was suspended in water. The volume of the object was then determined by the formula:

$$\frac{\text{loss of weight in water}}{\text{density of water}}$$

Comparison of densities. The ratio of the density of a material to the density of water, known as specific gravity, is useful to know in comparing the densities of materials. The simple formula for specific gravity is the weight of the material divided by the weight of an equal volume of water. The specific gravity of most materials is readily available, but there are occasions, as in fabricating laminates, where it may become necessary to find the specific gravity on one's own. High-strength properties coupled with low density in a material can spell economy in shipping costs.

After saying all this, however, it is necessary to add that density alone gives no assurance of strength

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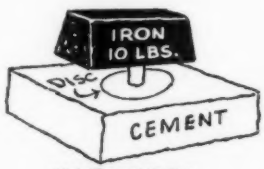
and other desirable qualities in a packaging material; for example, hardness: Lead is a very dense material, but compared with steel, it is a soft material.

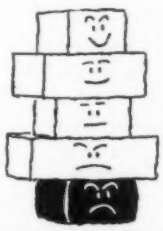
Hardness. Hardness, in the mechanical sense, means resistance to deformation or indentation. Hardness can be extended to mean resistance to impact, to abrasion, or



HARDNESS

to cutting or scratching. Indentation hardness is determined by the amount of resistance a material will offer to an indenting tool, for example, a metal disc under the pressure of a specific load. An arbitrary scale can be made up from the resistance offered by each of ten materials, varying stepwise in their vulnerability to deformation.

Impact resistance can be measured by the rebound of an object dropped on the surface of the material under evaluation. The height of the rebound is a measure of the resilience of the material. Resilience is a factor, though not the only factor, in impact hardness. The physical laws that govern resilience


FATIGUE STRENGTH

are complicated and involve molecular theory, but in a very general way, they may be described in terms of the laws of elasticity; specifically, the ability of a material to resume its natural form after it has been stressed. The simplest analogy would be a steel spring

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AUTOMATIC JAW SEALER-LABELER

DOUBLE SPEED

As the Doughboy Automatic Jaw Sealer-Labeler takes over one-half the work formerly handled by the operator, production is increased by approximately 50%.

When the bag is placed in position, the pneumatic arm control holds it, delivers the label to the bag, centers the label, applies the label, seals the bag, and discharges the labeled sealed bag, all automatically. Operator does not have to attend the package through the labeling-sealing cycle, but prepares next bag for the machine. She works no harder but packages are labeled and sealed at twice the speed.

DOUBLE SAVING

With the Doughboy Automatic Jaw Sealer-Labeler turning out sealed and labeled packages approximately 50% faster, the direct labor cost per package is cut in half.

With positive one-at-a-time label delivery, exact automatic centering, throw-outs due to off-center labeling, doubled labels and machine jams are practically eliminated.

Precision engineered and ruggedly built for the continuous operation, the Doughboy Jaw Sealer-Labeler will function in production line sealing and labeling of cellophane, cello-laminates, polyethylene and saran bags.

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NEW RICHMOND

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Can this still go out tonight, Mr. Trumbull?

Certainly can, Miss Davis. As soon as I put this Safetex in the dispenser.

Just be sure it's wrapped tight!

We haven't had a package pop open yet, Miss Davis.

In the mailroom or in the shipping department, Safetex *meets* exacting requirements because it's *made* to exacting requirements. The Safetex glue coating, you see, is AccuRay controlled at the one peak level where sticking speed and holding power are greatest. Cuts application costs—increases efficiency. Order and see!

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which will accept stress, within its elastic limits, but "spring" back into shape once the stress is relieved.

Abrasive hardness can be determined by tests which cause changes in the appearance of a material (as by cutting) and/or loss of weight (wear), and consequent decrease in one of its dimensions. Complete abrasive hardness would mean the total loss of any resistance to friction—which would be undesirable since it would then be impossible to stack or handle containers possessing such a property. However, all substances have sufficient irregularities to produce adhesive and cohesive forces which prevent such a state of affairs.

Force And Gravity

This brings us to a quick look at force as an expression of gravity. Gravity is called a "normal" force. When a mechanical or man-made force is introduced that runs counter to, or at an angle to, gravity, *friction* is the result. In sliding objects, the "coefficient of friction"

FRICTION

(c.o.f.) is expressed as the force producing the friction, divided by the force of gravity. Thus, if a five-pound shove is required to move a fifteen-pound container along a *horizontal* surface, the c.o.f. is 5/15, or 0.33.

The area of the container surface in contact with the horizontal surface is relatively unimportant in increasing the c.o.f. if the container load is evenly distributed. However, if it is not so distributed, or if the surface along which the container slides contains moisture, or if the atmosphere through which the container moves is humid, the abrasive effect is increased or decreased, depending upon the nature of the container material. High temperatures can be produced be-

when package overweights can mean lost dollars . . .

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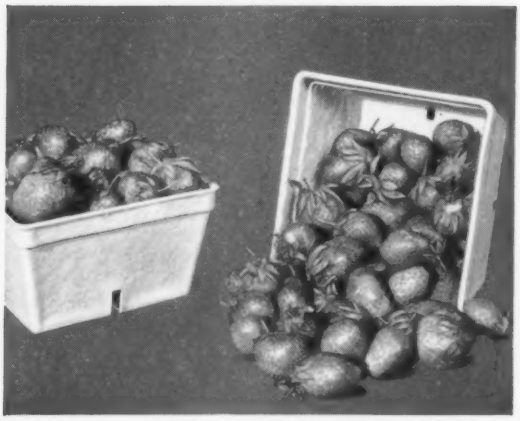

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Modern contour packaging with molded pulp is being increasingly recognized as the most effective method of protecting a wide variety of items. The most delicate merchandise can be shipped with greater safety when shielded by these form-fitting pulp shapes. In addition to savings from reduced breakage, nested contour packaging material is well suited to modern automation, saves valuable storage and shipping space and is usually less costly.

Years of experience in the field of molded pulp coupled with modern plants and manufacturing skills, are available at Keyes to design and produce a more efficient, more economical packing for your products. Our Product Development Division will be glad to supply further information and cooperate with you in developing contour packaging for your products.

Product Development Division, Dept. 42

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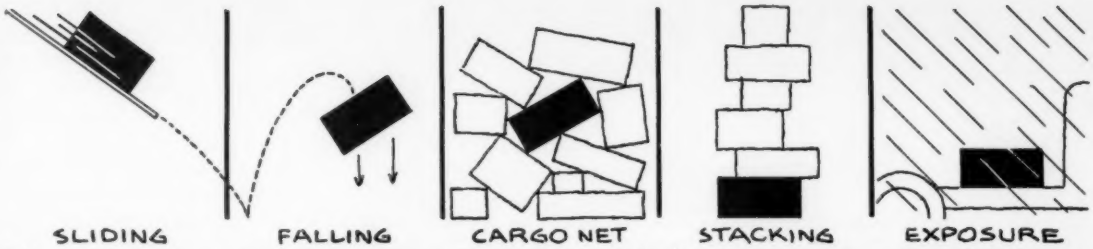

A few of the stress-strain adventures of a container during its travel to point of delivery.

tween surfaces with high coefficients of resistance—a situation with high potential for damage.

Coefficients' contradictions. Although the coefficient of resistance of a material is related to wear, there are some contradictions. Rubber and many plastics have a high c.o.f., but a low wear rate. The elasticity and extensibility of rubber and rubber-like materials apparently are responsible.

The erosive factor in abrasion is a fairly simple physical phenomenon. When a container moves along a rough surface, a shearing or chipping effect occurs on the two surfaces in contact. Moisture and high temperatures usually accelerate erosion, and the effect of static electrical charges, induced by friction, also is degenerative.

Tensile strength. Forces that cause extension or stretching of a material are determined by placing a strip of the material to be tested between two grips, one of which pulls away from the other, letting the load exert its force on the area to be tested. Strength of the material is then described in terms of the pounds of stress per inch of area under strain which the material will sustain up to the moment of rupture. With metals it is usually stress per square inch.

Elastic materials are perhaps of greatest interest with regard to tensile characteristics. The basic law of elasticity is that the stress (external force or "tensile load") exerted on a material, divided by the strain (the loaded area which produces the deformation of the material) yields the constant, i.e., the index of tensile strength. A formula of great usefulness is Young's Modulus which may be stated as:

$$\frac{\text{Stress}}{\text{Strain}} = \frac{\dfrac{\text{Force}}{\text{Area (i.e., cross section)}}}{\dfrac{\text{Elongation}}{\text{Original length}}}$$

(*Turn Page*)

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U. S. SIPHON FILLER. For all liquids including foamy products or products that do not permit agitation. Stainless steel tubes; acid resistant glass lined tank. Adjustable for all containers. Send for the Siphon Bulletin.

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RONDO *"the pack with the built-in shock absorber"*

HOLDS and PROTECTS SMALL, DELICATE OBJECTS While Handled in Production, Shipment and Storage

THE UNIQUE FEATURES PROVIDE:

Full advantage of the Rondo features is achieved when the Rondo tray itself is introduced early at the proper place in the production line. Here objects are inserted in the partitioned flutings and are then conveyed in the same unit through the various stages of control, storage, shipment and point-of-sale display.

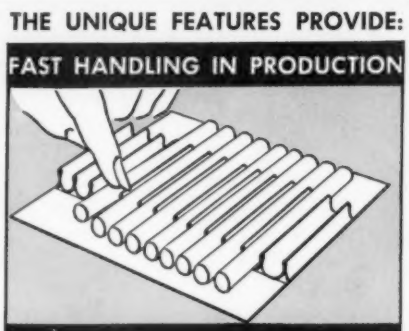
Objects readily "snap" into the Rondo spring-clip flutes and are held firmly even if turned upside down! The predetermined number of items held by one Rondo tray makes possible a swift, accurate count at any time during the operation. Inspection is fast and efficient because the product is completely visible, which is not existent with other types of partitions where objects are loosely held in an upright position.

Objects are stored in the same Rondo tray even in open stacking to assure quick count for checking or inventory. These filled Rondo trays are then directly packed in cartons for bulk shipping, or slipped into folding boxes for dispatching small units.

In shipment, the shock-absorbing features are fully realized. Each object is actually suspended in a cushion of air and separated from the others by the same means. No padding is needed because Rondo itself virtually eliminates breakage from impact.

Upon arrival, each object is easily accessible, no time is lost in unwrapping or untangling. The filled Rondo tray may be combined with a decorative folding box, cellophane cover, or without reloading, it can be inserted directly in a point-of-sale display.

FAST HANDLING IN PRODUCTION



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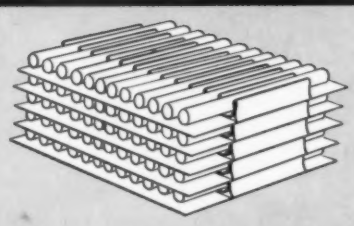
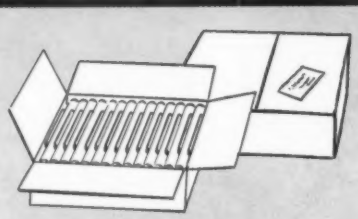


SAFE RIDE IN SHIPMENT



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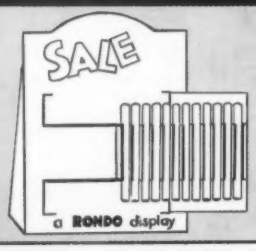

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Explaining The Formula

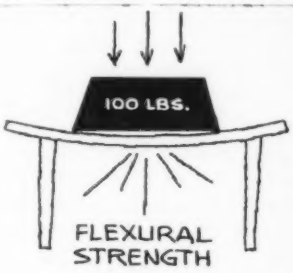
This is essentially an extension of Hooke's Law (1660) which was forecast earlier in this paper with reference to the steel spring: "A spring will be extended in direct proportion to the force applied to it." This holds true, of course, only within the limits of elasticity. When the force is removed, the spring returns to its original conformation. In application to materials, the explanation of this phenomenon of return to an original conformation lies deep in molecular theory.

In an extremely general and over-simplified way, we can say that the molecules of many substances, particularly the plastics and rubber, are long-chain or polymeric. In a theoretical sense, they are coiled, like springs, and have an innate tendency to return, after stretching or uncoiling, to their original configuration. The study of the interatomic and intermolecular forces involved in elasticity has yielded many improvements in container materials of the elastomer class. Synthetic elastomers can be contrived to suit requirements the natural elastomers cannot meet.

Compressive strength. Compressive strength is the opposite, broadly considered, of tensile strength. It is tested in the same way—by applying a known stress to a selected area of test material. The moment of failure, that is inability to withstand further crushing without complete collapse, describes the limit of compressive strength. Honeycomb materials, for example, have good compressibility, but reach a limit under stress, and lose their compressibility entirely. Foam rubber has a high recovery potential.

COMPRESSIVE STRENGTH

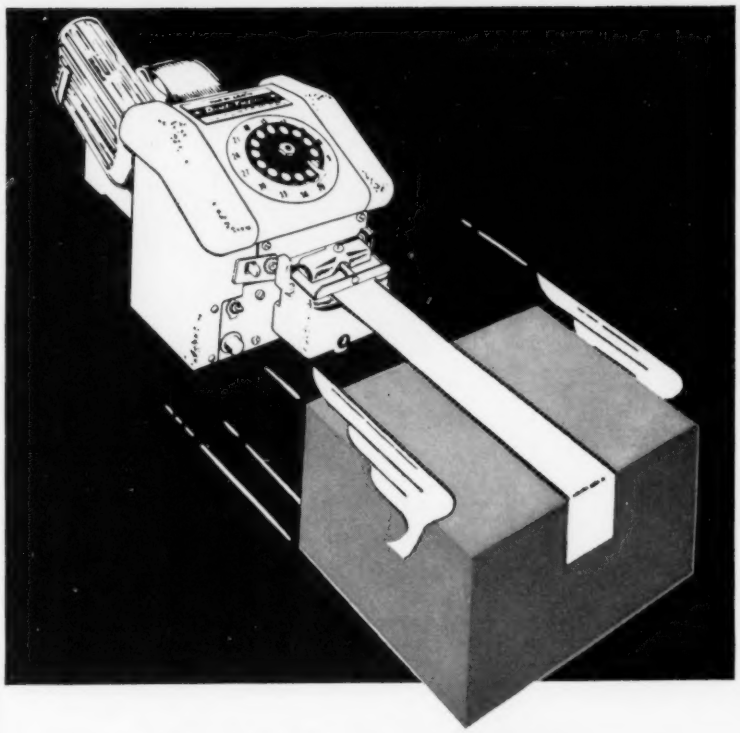
Flexural strength. Flexural strength, the amount of bending stress a material can take, is also measured in terms of stress per square inch of the area under strain. Speaking of metals, woods, and some plastics, this type strength is often quite important. For many lighter, thinner materials such as paper, flexural strength is important only if rigidity is a requirement, as, for example, in "crush-proof" paper boxes.

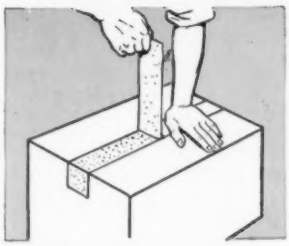


For flexural tests on wood, metals, and plastics, the stress load is placed transversely across the material. Flexural tests rely also on Hooke's Law since the ability of material to sustain bending and, desirably, return to its original shape, is the object of measuring flexural strength.

Shear strength. Shear strength can be described as a pair of forces acting in different directions, not along the same plane. When the parts of a body or material "slide" over each other to form a new shape, we have an example of shear. A simple illustration would be the effect created when you push (one force) in a horizontal direction against the top layers of a stack of sheet materials. The stack tilts "askew" or into a form whose front and rear surfaces are parallelograms because the force of gravity (second force) is pulling downward and holds the bottom layers in place.

By dividing the total shear ("push") by the bottom area of the stack which resists the shear, the resultant is the coefficient of shear strength. The formula would be: Coefficient of shear strength equals the shear force divided by





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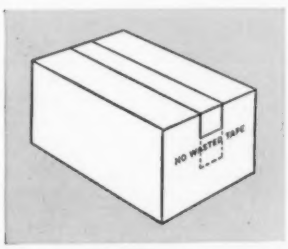

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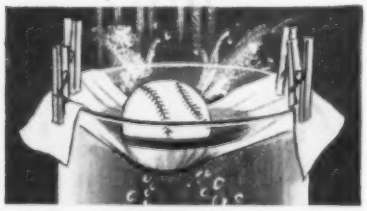

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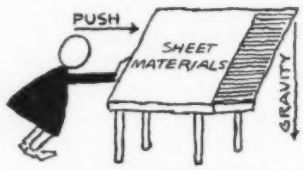
the area of resistance. Considered horizontally, shear stress exerted against the top portion of a body is greater than the gravitational stress on the material.



SHEAR STRENGTH

In other words, when the flat of the hand is pressed against the top layers of the stack, the horizontal component of the force (the "sliding-over-each-other" action) is the more disruptive of the two forces (the "push" and gravity) being exerted. When a body is homogeneous, like jelly or a roast of beef, the shear force acts in the same way, but the shear force becomes involved immediately in molecular laws.

Rigidity or stiffness. Rigidity is definable in terms of tensile, compressive, flexural, and shear strengths, and is therefore a good property to consider after these other properties have been explained. The importance of measuring each of these components of rigidity becomes clear when one considers the adaptability, for example, of fibreboard to the packaging of food cans. Tensile strength is required because, among other reasons, of the strains imposed on the fibreboard in such actions as man-carrying of supplies.

Flexural strength is required since the material must be able, within reasonable limits, to withstand bending such as is imposed when the carton is lifted off the ground. Shear strength is important since handling, as in a cargo net, may set up shear forces that bear down on a vulnerable area of the carton and "skew" it out of shape. As a material is stressed in one direction, lateral stresses are set up that may impose strains impossible for the container to withstand.

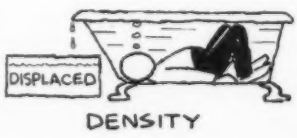
Fatigue strength. Fatigue strength is another physical generalization.

It can be taken to mean the repeated stresses which, even though not carried to the breaking point of a material, may so weaken the intrinsic strength properties that performance failures are inevitable. The probable number of stress repetitions which a container must withstand during its useful lifetime forms the basis for predicting performance and for adjusting the strength of materials to the jobs they must perform. It is not necessary, except in rare instances, to strive for absolute resistance to fatigue.

Value Of Testing To Package Engineering

Containers are manufactured to fulfill particular missions or jobs. In the course of their work, they must sustain almost innumerable stresses—drops, including air drop from planes; impact, as when heavy objects are dropped upon them; squeezing action, as in cargo nets; and sliding action forces; not to mention the less tangible forces exerted by the nature of the loads they carry. The increasing availability of physical testing results has made it possible to apply these results to the strengthening of materials, and even more important, to develop a new approach to the economics of packaging.

As a matter of fact, physical testing is as important in detecting



what desirable properties are lacking in a material as it is in determining the degree to which desirable properties are present. With the aid of the astounding revelations being made in the physical propensities of molecules and molecular interrelationships, it is assured that the containers of the future will be equipped, in accordance with the need, to move with impunity along the traffic lines of commerce.

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Leroy O. Anderson holds a B.S. degree in architecture from the University of Minnesota and has been employed by the Forest Service since 1934—the past 15 years at the Forest Products Laboratory as an engineer. He has been closely associated with packaging research for 10 years and most of his work has been devoted to crate and container work, including the development of crate design standards. Mr. Anderson is a registered professional architect, a member of Forest Products Packaging Council, and of the Wisconsin chapter of Sigma Xi.

Nails and their characteristics in boxes and crates

By L. O. Anderson,
Engineer,
Forest Products Laboratory,[1] Forest Service,
U. S. Department of Agriculture,
Madison, Wisconsin

Discussing the characteristics and functions of nails as used in boxes and crates, Mr. Anderson reviews nail types such as common and box nails, cement-coated, etched, and deformed shank nails, and reviews factors affecting the withdrawal resistance of nails. In this connection he discusses problems of direct withdrawal, as well as those of lateral resistance. His specific and practical recommendations reflect the broad experience of the famed Forest Products Laboratory, with which he is associated.

Nails are the most common fasteners used in the construction of wood boxes and crates. Staples and similar hand- and power-driven fasteners are sometimes used to assemble various parts of the container, but under most circumstances their use does not reduce the total number of fasteners required. Because of the importance of nails, this article discusses their characteristics and functions when they are used in boxes and crates.

Nail Types

Nail manufacturers have provided a large variety of nails for containers of all types. These nails are made from steel, aluminum, copper and other metals, and have different sizes and shapes. Some of the types most often used in construction of boxes and crates are shown in Fig. 1 and described as follows:

Common and box nails (bright). Common nails and smooth box nails are most often used in fabrication of boxes and crates where nail clinching is required (Fig. 1). Clinching increases the resistance of nails to withdrawal, so that coating or other treating of the shank is not necessary. Common and box nails are the same length, but the box nail is smaller in diameter for a given penny size.

Another type of nail commonly used to fasten plywood and other sheet material to heavier members is the clout nail. These nails vary in length from 3/4 to 1/2 in., have long tapered (duckbill) points that are easily clinched, and have heads that are larger in diameter than most container nails of comparable length.

Cement-coated nails. Cement-coated nails are made of steel and have a coating of resin or similar material to increase their resistance to withdrawal. These nails are perhaps the type most generally used in the assembly of boxes and crates. Cement-coated nails can be obtained in a variety of sizes and diameters, such as the sinker, corker, cooler, and the cement-coated box nail.

Etched nails. Etched nails are bright steel nails that are treated in a chemical solution, developed at the Forest Products Laboratory, to provide a roughened surface and thereby increase their withdrawal resistance (Fig. 1).

Etched nail surfaces have several advantages over those with cement-coated shanks, notably in that the effect in increasing withdrawal resistance is somewhat more permanent than cement-coated nails; in addition, etched nails are effective with woods of all densities (dense woods tend to rub off the cement coatings when the coated nails are driven into them). A simple etching procedure recommend-

[1]Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

ed by the Forest Products Laboratory provides for immersing nails in monoammonium phosphate solution. The following steps are suggested:

1. Prepare a solution of ten per cent (by weight) of commercial monoammonium phosphate and water. Do *not* use metal container for preparing or storing solution. Keep solution near room temperature (about 70° F.).

2. Immerse nails in solution for about seven hours, stirring occasionally. Five gallons of solution are sufficient to etch about 100 lbs. of nails.

3. At end of etching period, remove nails and rinse them with water.

4. Air dry nails to prevent them from rusting.

Other roughened shank nails that increase the withdrawal resistance somewhat are the sandblasted, parkerized, and the galvanized (zinc-coated) nails.

Deformed-shank nails. A comparative newcomer in the family of nails is the deformed-shank nail. These nails have been designed to retain a great percentage of their resistance to withdrawal even after many moisture changes of the wood. The most common varieties of these nails are the spirally grooved nail and the annular-grooved nail, Fig. 1. In general, annular-grooved nails sustain larger static withdrawal loads and spirally grooved nails sustain greater impact withdrawal loads than the other nail forms.

Nail points and heads. Nails can be obtained with many variations in nail point and nailhead design. One of the nail points used on many nails is the diamond point (Fig. 2). The clout nail has a duckbill point that is easy to clinch because of its taper. Other points shown in Fig. 2 are the needle point, the chisel point, and the blunted diamond point. The blunted-point nail, for example, will minimize the tendency of pointed nails to split dense woods.

Nailheads vary somewhat in diameter and thickness, as Fig. 2 illustrates. The flat head is usually found on such nails as the common and cement-coated cooler nails. The countersunk head has a fillet to reinforce the nailhead and minimizes the chance that the nailhead will break off. The cement-coated sinker nail has the countersunk head. The cement-coated box nail is provided with a broad flat head that may shear off when it is driven into a dense wood. Nails with strong heads should be used in dense woods.

Nail sizes. The size of most nails used for containers is based on their length; the diameter or gage varies according to the length and type of nail. These sizes are usually expressed in the "penny" system, and abbreviated as "d." For example, a sixpenny nail is a 6d nail, an eight-penny is an 8d, and so forth.

A sixpenny common nail is 2 in. long, an eightpenny 2-1/2 in., a tenpenny 3 in., and a twelvepenny nail 3-1/4 in. long. Cement-coated nails are 1/8-in. shorter for each of the sizes listed.

The gage or diameter of nails also varies by nail types. The eightpenny common nail, for example, is 10-1/4 gage, the eightpenny cement-coated sinker nail is 11-1/2 gage, and the eightpenny cement-coated box nail is 12-1/2 gage.

Factors Affecting Withdrawal Resistance Of Nails

Many factors affect the resistance of nails to withdrawal. Most of these factors cannot be calculated and to discuss all the variables would take too much space. Therefore, only the more important factors are listed here, together with a brief statement regarding their effect on withdrawal resistance of nails in general.

Surface condition of nails. Generally speaking, roughened or de-

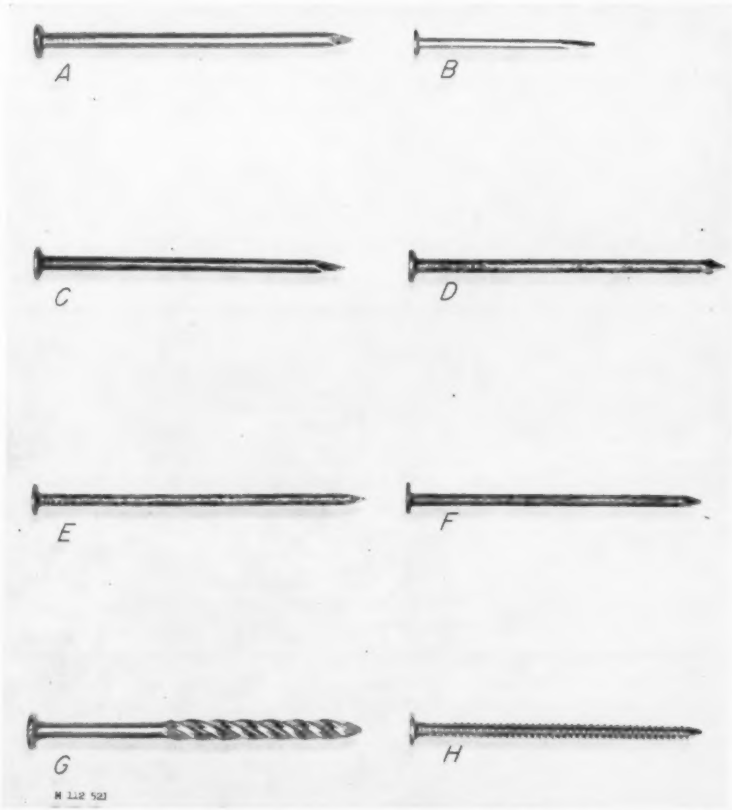

Fig. 1. Nail types. **A,** common; **B,** clout; **C,** sinker (cement-coated); **D,** cooler (cement-coated); **E,** box (cement-coated); **F,** etched; **G,** spirally grooved; **H,** annular-grooved.

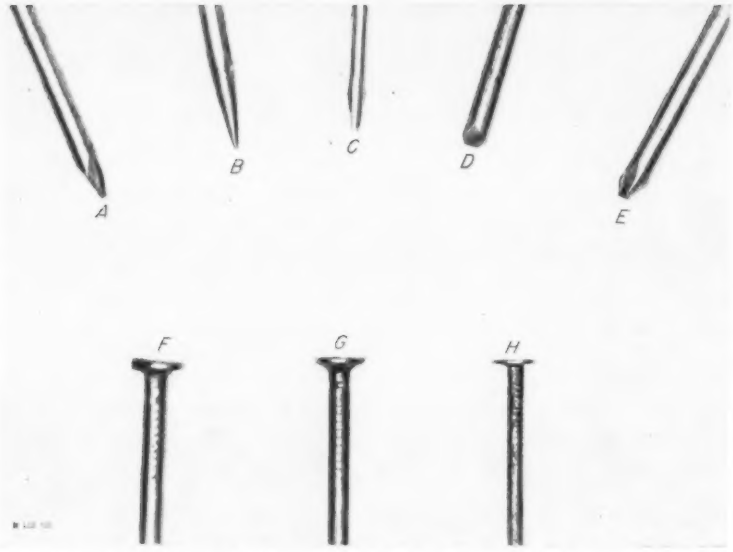

Fig. 2. Nail points and heads. **A,** diamond; **B,** needle; **C,** duckbill; **D,** chisel; **E,** blunted; **F,** flat; **G,** countersunk; **H,** broad flat.

formed-shank nails have greater resistance to withdrawal than smooth shank nails.

Nail points. Nails with long, sharp points have greater withdrawal resistance than nails with diamond points, but the sharp-pointed nail has a tendency to split certain species of wood, which lowers its withdrawal resistance. Blunting the end of a long-pointed nail will reduce its tendency to split the wood. On the other hand, a nail with too blunt a point destroys the wood fibers when it is driven, and its withdrawal resistance is substantially reduced in comparison to that of a diamond-pointed nail.

Nailheads. Nailheads should be sufficiently large and strong, so that they will not pull through or break off when the nail is stressed, with a consequent loss of joint strength.

Clinched nails. Clinched nails normally have much higher withdrawal resistance than unclinched nails. This increase can vary anywhere from 50 to 400 per cent. Nails clinched across the grain of the wood have approximately 20 per cent more resistance to withdrawal than nails clinched along the grain.

Overdriving. Overdriving of nails reduces the amount of wood under the nailhead and may reduce withdrawal resistance, especially when the head is embedded in thin sheathing.

Prebored lead holes. Prebored lead holes are often necessary to prevent large-diameter nails from splitting dense wood. A prebored hole about three-fourths the diameter of the nail is often used.

Nails in plywood. Because plywood resists splitting better than solid wood, nails can be driven more closely along its edges. However, the withdrawal resistance of nails in plywood is about 20 per cent less than in solid wood of the same species.

Depth of penetration. As depth of penetration increases, so does withdrawal resistance of a nail because there is more contact area between the nail and the wood fibers. In lateral resistance, however, after a certain minimum penetration there is no increase as penetration increases.

Species and density of wood. The species and density of wood have a definite influence on the withdrawal resistance of nails. Generally, the higher the density, the greater the withdrawal resistance. However, the denser the wood, the greater the probability that it will split.

Moisture content. Changes in moisture content of wood have a great effect on the holding power of nails. When green lumber shrinks in drying, it decreases the withdrawal resistance of nails. It is good practice to use container

TABLE 1.
Factors for calculating allowable strength of nails in seasoned wood

Hardwoods	Specific gravity[1] G	$G^{5/2}$	Softwoods	Specific gravity[1] G	$G^{5/2}$
Aspen	0.41	0.11	Cedar, white	0.35	0.07
Cottonwood, Eastern	.43	.12	Douglas-fir, coast type	.51	.19
Elm, American	.55	.22	Fir, white	.41	.11
Oak, red	.66	.35	Hemlock, Western	.44	.13
Sweetgum	.53	.20	Pine, sugar	.38	.09
Yellow-poplar	.43	.12	Southern yellow pine	.59	.27

[1]Based on weight and volume of wood when ovendry.

TABLE 2.
Sizes of bright common wire nails

Size	Gage	Length	Diameter	$D^{3/2}$
Penny		Inch	Inch	Inch
4	12½	1½	0.098	0.0307
6	11½	2	.113	.0380
7	11½	2¼	.113	.0380
8	10¼	2½	.131	.0474
9	10¼	2¾	.131	.0474
10	9	3	.148	.0570
12	9	3¼	.148	.0570
16	8	3½	.162	.0652

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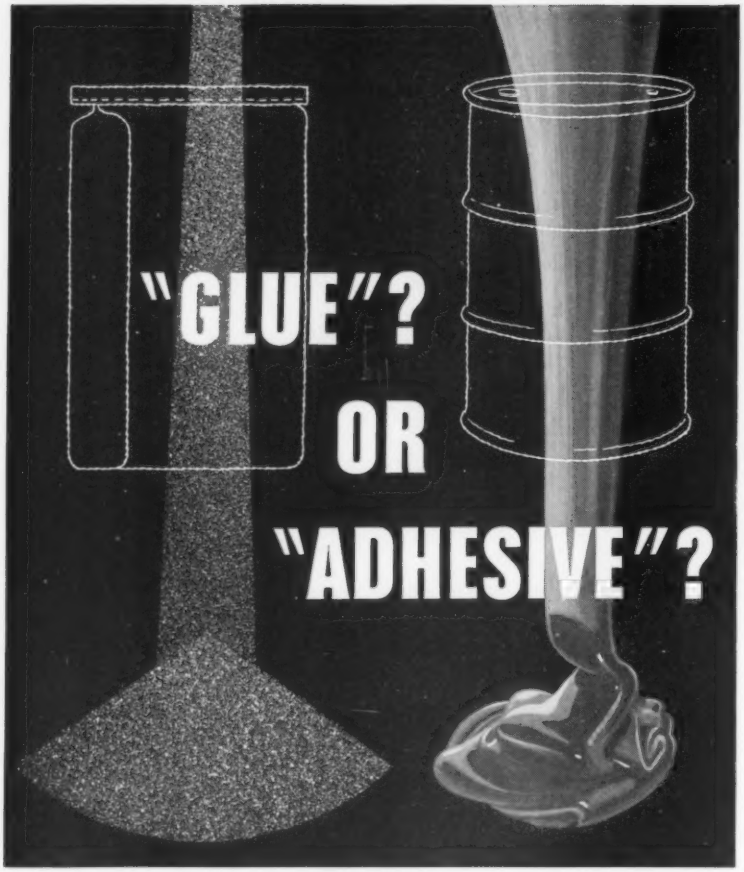

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How To Determine Nail Resistance

The two main values that can be calculated for nails used in assembling boxes and crates are (1) their resistance to direct withdrawal, and (2) their resistance to lateral stresses. The formulas for calculating these values have been developed[2] to determine the allowable loads for direct withdrawal and for lateral resistance of nails. These values are based on the condition of the wood as well as the nail itself. Factors involved are the specific gravity of the wood, the diameter of the nail, and the depth of penetration of the nail. Only side-grain nailing is considered in the formulas, which are based on nails with circular, uncoated, undeformed shanks.

Direct withdrawal. Direct withdrawal is the movement of a nail, in the direction of its length, from a piece of wood. The following formula may be used to determine the allowable direct withdrawal load for a nail of any size under loading conditions that are typical of boxes and crates:

$$P = 1{,}380\ G^{5/2}\ D$$

Where P is the allowable load in pounds per inch of penetration into the member receiving the point (side grain of seasoned wood); G is the specific gravity of the species of wood, based on weight and volume when ovendry; and D is the diameter of the nail in inches.

Table 1 lists the specific gravity, G_1, and the $G^{5/2}$ value for a number of woods that are commonly used in the construction of boxes and crates.

For convenience in determining withdrawal values as well as in calculating the lateral resistance of nails by formula, Table 2 lists nail diameters and other data for the bright common nail. When nails

[2]Forest Products Laboratory. Wood Handbook. U. S. Department of Agriculture Handbook No. 72, 1955.

TABLE 3.

Average allowable load[1] for nails in direct withdrawal[2] (nails with diameters and lengths equal to sinker nails)

Wood species	Allowable load at nail size of					
	6d	8d	10d	12d	16d	20d
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Basswood, cottonwood, true firs, pines (except Southern yellow), spruce, yellow-poplar	18	27	35	42	49	58
Western hemlock, red pine, redwood	25	37	48	58	66	79
Soft elm, sweetgum, black ash, soft maple	34	51	66	81	93	111
Douglas-fir, Western larch, Southern yellow pine	38	56	73	89	102	121
White ash, beech, birch, hard maple, oaks, rock elm	59	88	114	140	159	190

[1]Based on normal conditions for containers.
[2]When driven in side grain of seasoned lumber to a depth equal to two-thirds of its length.

TABLE 4.

Average allowable loads[1] for nails in lateral resistance[2] (nails with diameters equal to sinker nails)

Representative woods	Allowable load at nail size of					
	6d	8d	10d	12d	16d	20d
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Basswood, cottonwood, true firs, pines (except Southern yellow), spruce, yellow-poplar	30	41	45	54	62	81
Western hemlock, red pine, redwood	37	51	57	67	77	101
Soft elm, sweetgum, black ash, soft maple	42	57	63	75	86	112
Douglas-fir, Western larch, Southern yellow pine	46	63	69	82	94	123
White ash, beech, birch, hard maple, oaks, rock elm	56	78	85	101	117	152

[1]Based on normal storage and handling conditions.
[2]When driven in side grain of seasoned lumber, minimum distance of penetration equal to ⅔ of its length in the lightweight woods or ½ in the denser woods.

of different types are used, such as the sinker nail, the gage, diameter, length, and other values will also change.

The type of nail most often used in the assembly of boxes and crates is the sinker nail. Table 3 lists the average allowable load in direct withdrawal for the sinker nail (or nail of equal diameter and penetration) in box and crate construction.

The values given in Table 3 do not include allowance for any shank treatment, shank roughening or deformation. The additional resistance that nails of these types provide may be considered a safety factor.

Lateral resistance. Lateral resistance is the resistance of the nail to lateral loads or stresses applied at a right angle to the length of the nail. For example, this type of force is one to which the nails that are used to fasten the ends and sides to the base of a crate are subjected when the crate is lifted by grabhooks.

As in the method used to determine allowable direct-withdrawal values, the specific gravity of the wood as well as the nail diameter must be considered in the calculations of allowable lateral loads. The formulas are based on the penetration of uncoated circular-shank nails into the receiving member for a distance of approximately two-thirds of their length in softwoods or one-half in hardwoods (species of low and high specific gravities respectively).

The following formulas can be used for determining the allowable lateral resistance of nails driven into the side grain of various kinds of wood. The values are based on average stresses placed on containers.

Basswood, cottonwood, true firs, pines (except southern yellow), spruces, yellow-poplar:

$$P = 1{,}080\ D^{3/2}$$

Western hemlock, red pine, redwood:

$$P = 1{,}350\ D^{3/2}$$

Soft elm, sweetgum, black ash, soft maple:

$$P = 1{,}500\ D^{3/2}$$

Douglas-fir, western larch, southern yellow pine:

$$P = 1{,}650\ D^{3/2}$$

White ash, beech, birch, hard maple, oaks, rock elm:

$$P = 2{,}040\ D^{3/2}$$

Where P is the allowable load per nail in pounds, and D is the diameter of nails in inches. The values for $D^{3/2}$ for the various nails are given in Table 2.

Mr. Anderson has written two previous articles for PACKAGE ENGINEERING: *"Technique of nailing a wood box," page 21, June, 1957, and "Technique of nailing a wood crate," page 44, November, 1957.*

UNSCRAMBLES REGULAR AND ODD SHAPES

Faster . . . Easier

ISLAND STRAIGHTLINE UNSCRAMBLER

SPEEDS UP PRODUCTION

• Cartons or cases of bottles, jars, or cans dumped on table are instantly unscrambled and regimented into a single file to keep a continuous flow of units on your production line. Reduces labor costs . . . minimizes breakage . . . saves floor space . . . and meets all sanitary specifications as operator does not handle mouths of units.

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Please send full details on the Styl-O-Matic Unscrambling Tables as described in Bulletin ST-1

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Model SD-1T

This *new* Post electronic counter outmodes all mechanical counters. Capable of operating at speeds up to 100 units per second, a single "count" is indicated on the six digit totalizer as each *tenth* item breaks the light beam. For counting dozens or gross a 12 place counting tube can be substituted. May be operated from microswitch, photohead or Post magnetic switch.

Standard SD-1T **$140.00**

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Same as above, without totalizer. Boosts service life of mechanical registers 15 times by counting in units of 10. Can be placed several hundred feet from switch contacts.

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With Remote Totalizer **$125.00**

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Magnetic Switch . . . high speed — ideally suited to sensing applications — will actuate electronic counters, mechanical counters, controls, solenoids, relays and many other circuits. Capable of speeds up to 100 cycles per second. Long service life.

Feature . . . sharp, clean make or break — no lag, no bounce.

Thousands in use **$29.75**

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Simple device equalizes case packing workload, saves packers from counting cans

Here is a way to equalize the workload of those who hand-pack cans into cases: Simply mark the file of cans into 12's by kicking out every 12th can. A set of magnets and a star wheel turn the trick. Now, packers do not have to count the cans.

Hand-packing of cans in a 6x6 pattern into a shipping container on the powder-filling line at Stanley Home Products, Inc., at 120 per minute requires only two men. But, as originally set up, the head man did more packing than the end man—who frequently had to wait for enough cans to fill his case. The industrial engineering department studied the matter and requested Stanley's plant engineering organization to make some sort of a device to equalize the workload. Engineering came up with the method described here on its second try.

Fig. 1 shows just how it works. Every 12th can is pulled out of line on the conveyor belt so that each packer gets the correct number of cans without counting. The method will work equally well with a 4x3 pattern or with one, two, or three layers deep in the shipper.

First Try: Compression Spring

A fibre star wheel with twelve points was mounted on the line as shown in Figs. 2 and 3. At first a compression spring was mounted in one of the pockets of the star wheel, with the idea that it would push every 12th can out of line. While it operated much as planned, it was not entirely satisfactory. So, another method was tried and it worked—successfully.

Second Try: Horse Shoe Magnets

This time a pair of horse shoe magnets were clamped to the top and bottom of one of the pockets in the twelve-point star wheel as shown in Fig. 2. The idea was to take advantage of the fact that the containers were made of metal which would be attracted by magnetic force.

As the star wheel revolves, the magnets come into contact with every 12th can, and the attraction is sufficient to drag it out of line, as shown in Fig. 3. As soon as the can is about 1-1/2 in. out of line, the drag of the can on the belt conveyor (aided, perhaps, by the spring guard) will overcome the magnetic pull and cause the can to break loose in the manner shown in Figs. 1 and 3.

The device is simple and cheap, and works exactly as the industrial engineering department specified.

Fig. 1. This automatic, self-actuating gadget marks every 12th can by pulling it out of line. Thus the two packers always do the same amount of work.

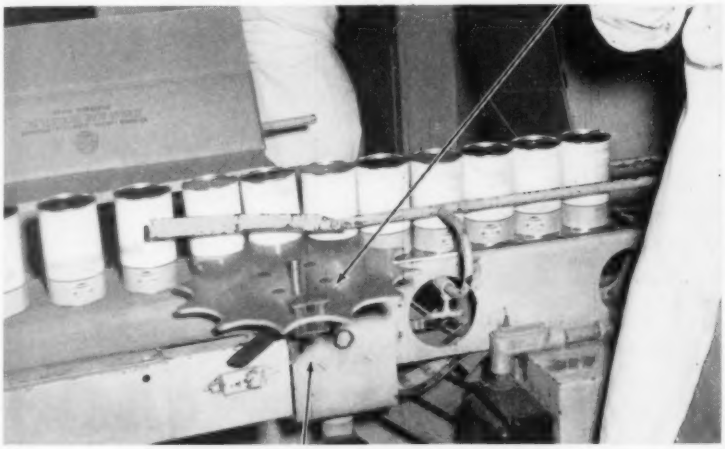

Fig. 2. Close-up of the fibre twelve-point star wheel with horse shoe magnets clamped above and below one of the pockets. (Marked by arrows.) Magnets exert enough pull to drag a can 1½ in. out of line.

Fig. 3. Can has just been dragged out of line until it broke loose from magnets. The spring guard makes certain the can is not carried too far.

protect
your products,
parts, prints
in the amazing

ZIP LIP

polyethylene bags

seal with only finger pressure • open easily with thumbnail . . .

reseal/reopen/repeatedly

Thousands of consumer and industrial products can be packaged better and *Sold Easier* in these moisture-proof, dust-proof, Zip-Lip "See Thru" bags. Either printed one or two sides or plain, they are unexpectedly low priced.

What do you package that can be better protected, shown and *SOLD* in the bags that seal, reopen, reseal, *repeatedly?*

Offices in Many Principal Cities
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kennedy

Charles J. Bruckner has been associated with F & F Laboratories, Inc., as production manager for the past six years. Prior to joining F & F, he devoted some 30 years to various positions in the packing industries — ranging from foreman to plant superintendent.

Packaging people do not always agree on whether preventive or breakdown maintenance of machinery is preferable. But perhaps a more basic question is this: How clean and how well-lubricated is your machinery? Mr. Bruckner summarizes here the advantages of keeping machinery clean and tells how such cleanliness contributes to good maintenance. He also stresses the importance of adequate training and close follow-up of packaging line personnel in order to assure (1) prompt cleaning away of scrap and product particles before they can accumulate, (2) lubrication that is adequate but not excessive, and (3) correct care of machinery before, during, and following usage.

Keeping machinery clean pays maintenance dividends

By Charles J. Bruckner
Production Manager,
F & F Laboratories, Inc.,
Chicago

There is no substitute for clean and well-lubricated packaging machinery. While nobody would quarrel with this statement, a lot of people do have questions regarding just how to keep machinery that way. There is no easy answer. Our own way of keeping machinery clean and well-lubricated is to prevent dust, dirt, product particles, and the like from accumulating.

The core of our program is constant attention to machine clean-up. Underlying this attention is the basic interest of our top management in keeping both plant and machinery as nearly immaculate as possible. If your management takes as conscientious an interest in keeping things clean as our management does, you will have no trouble winning support for your efforts all the way down the line.

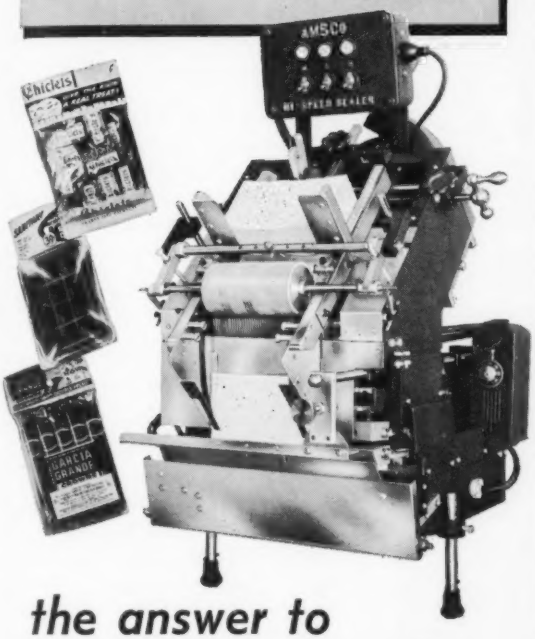
Three-part program. There are three parts to our machinery clean-up program: (1) Packaging line attendants constantly watch for the slightest accumulations of scrap and product particles and clean them off promptly; (2) clean-up crews go over each machine at the end of a run and no less frequently than every night; and (3) specially assigned crews carry out thorough clean-up work every weekend. In addition, specifically assigned oilers constantly circulate among machinery to keep it adequately lubricated.

Preventing Accumulations

Our basic clean-up tools are air hoses and wipers. We do not use water in our day-to-day cleaning. Because we prevent accumulations from building up, the air hoses and wiping techniques are adequate. We have an air hose at every machine in most instances and no less scattered than a hose for every two machines. Thus we have air hoses and wipers conveniently placed as constant reminders to packaging line crews — telling them, in effect, that their machinery demands prompt and systematic cleaning.

We emphasize promptness in keeping machinery clean. For example, when a package breaks or spills on a machine, our crews must clean up the spillage immediately. Many of our products contain sugar. We are very careful to prevent build-up of sugar anywhere on our equipment. For example, sugar or other particles may build up under pulleys and result in breaking, splitting, or tearing of belts. By preventing such accumulations, we prolong belt life and minimize replacement. *(Turn page)*

The AMSCO BAG SEALER/LABELER



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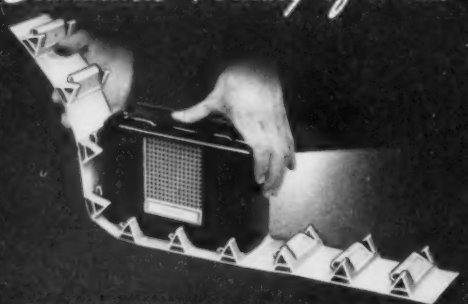
Eliminates Folding of Pads



SUS-RAP is produced in widths, slot sizes, and various strength qualities to ECONOMICALLY package YOUR product . . .

Exclusive VERTICAL-HORIZONTAL suspension safeguards your product both in and out of its shipping carton.

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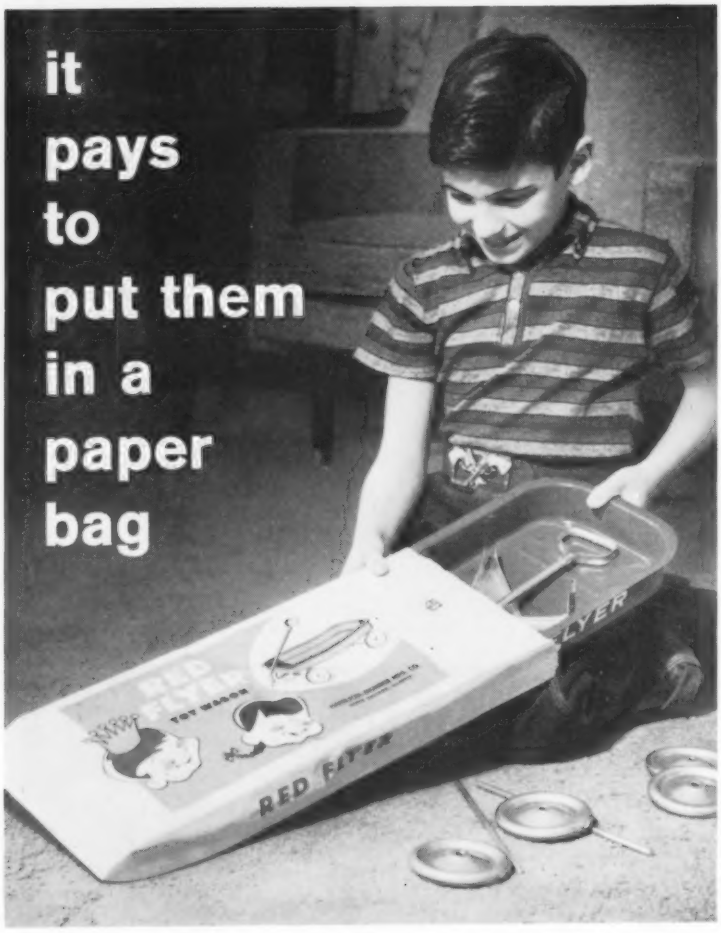
For more information circle No. 244 on Card

when you pack "knock-downs" for

HOME ASSEMBLY



Compact, convenient paper bags make excellent security agents for packaged home-assembly products. They speed packing, help lower shipping and handling costs, conserve valuable warehouse and shelf space.

Take the toy wagon bag, above. It packs 22 put-'em-together metal parts. Bag replaces carton, is lighter, less expensive. Colorful printing serves as economical advertising for brand name and contents.

Write for free Booklet P-3 today. It illustrates dozens of different ways paper bags are helping manufacturers save money, both inside the plant and out.

union camp

Commercial Packaging

UNION BAG-CAMP PAPER

CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

Cleaning machinery lets mechanics work faster. Our constant attention to machine cleanliness is a major help to our maintenance men. The plain fact is that they can spot sources of difficulty faster and do their work much more quickly when machines are clean. It is easier to see the true machine condition and it takes less of their time.

For example, if a machine is not clean, it may take a mechanic an extra 15 or 20 minutes merely to clean away the dust, oil, and other accumulation in order to see what given machine parts look like. If we prevent such build-up from occurring, he can see immediately the machine condition.

Preventive Maintenance: Do It

This is very important in our basic maintenance approach. We think preventive maintenance is definitely preferable to breakdown maintenance. At the same time we avoid the objections usually made concerning preventive maintenance because our clean machinery lets us get a truer picture of its condition. As a result we get longer part life.

Some production specialists assert that preventive maintenance is too expensive because it demands replacement of parts before the normal part life is gone. As a result, it means throwing away a good measure of part life. On the other hand, breakdown maintenance involves taking too much of a chance. If you wait for something to break, it will take a lot longer to repair or replace than if you anticipate the breakage by replacing the part in time.

See true machine conditions. This is just what we try to do: Anticipate as realistically as possible the life of machine parts and members. While we follow the general ideas of typical preventive maintenance, our exceptionally clean machinery lets us get additional life or wear out of parts because we have a better view of what is happening to them.

From the safety standpoint alone, breakage can cause a bad accident and may disrupt the production of an important order. Delays lasting

for hours may result from breakdown maintenance. We think it is always cheaper to keep the machine in working condition and we replace parts just when they start to show wear. At the same time, we avoid indiscriminate replacement of parts ahead of their normal time.

If we see that a bearing is getting bad, we replace it. Our maintenance people are very alert to minor details (such as frayed or broken wires) that lead to major breaks unless detected in time. If we did not keep our machinery in clean condition, we would not see these things in time to capitalize on the value of preventive maintenance without taking an excessive risk of breakdown maintenance by estimating part life beyond what some preventive maintenance experts would do.

Adequate Training

Training is an important feature of our program. For example, even though we have definitely assigned oilers who go around lubricating machinery, we insist on their being properly trained. Sometimes lubrication men are too generous in their oiling of machinery. As a result, the excess oil picks up product particles, dust, and the like. Both as a phase of our training and as part of our supervisory follow-up, when we find a man putting on too much oil, we insist that he wipe off the excess *at that moment.* It is important to take immediate action when you see excess oil.

Actually this phase of our program is simple and clear-cut because specific individuals are assigned oiling tasks. As a result, the people tending the machines normally do no oiling. If the oiler is not available, a mechanic would take over the task for him. The important thing is that we stress the right and wrong ways of doing it.

They learn specific jobs well. We find it helpful to let our mechanics specialize. We have four principal departments in our plant, each with its own mechanic. In addition, one all-around mechanic circulates through the entire plant. By insisting on such specialization, each

Stop sticking in heat sealers...

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SILICONE RELEASE AGENT

heat stable — easy-to-use

Here's a sure way to keep sticky materials from "gumming-up" packaging and labeling operations. Just apply *Slipicone* to your equipment. Films, waxes, adhesives and other packaging materials just won't stick to it!

Slipicone saves you money! Packaging equipment stays cleaner, more sanitary . . . cuts your maintenance costs. In heat-sealing, Slipicone prevents the pile-up, browning and ink smear that can ruin package appearance.

Spray or wipe it on: Available in 12 oz. aerosol bombs; 2 & 8 oz. tubes; 10 lb. cans. Try Slipicone now. Write for list of distributors.

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Let us know your problem. We'll be happy to submit recommendation.

If your problem is high speed coating of paint, varnish, glue, latex, etc. — POTDEVIN's sixty years of specialization in coating equipment can quickly help you solve it . . . guaranteeing initial low cost and top efficiency. Illustrated is just one of hundreds of special machines. It laminates rolls of materials up to 20" wide at speeds up to 50 feet per minute.

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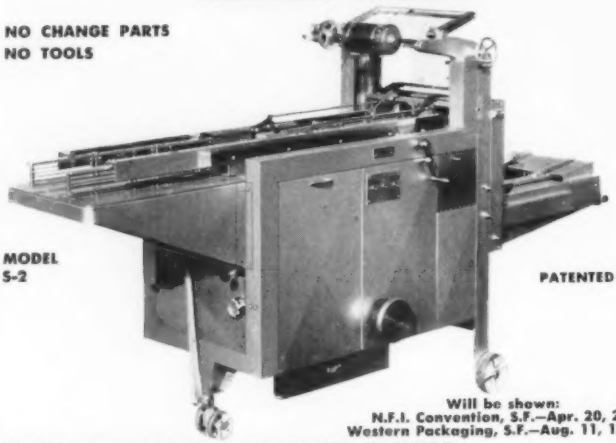
ONE MINUTE!

Changeover time with this
COMPLETELY ADJUSTABLE
WRAPPING MACHINE

NO CHANGE PARTS
NO TOOLS



MODEL
S-2

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Western Packaging, S.F.—Aug. 11, 12, 13.

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Mobility, Simplicity, Dependability, and many others for your convenience and satisfaction, such as a new package of beautiful symmetry. Now providing the utmost in satisfactory operation to many users.

For more information on this and our complete line of semi-automatic wrapping machines, write, wire or call

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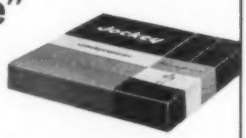
Boxmaster cost savings for . . . **KNIT GOODS**

"Reduced box cost, gained uniformity of appearance"

This famous brand name manufacturer of apparel uses Boxmaster machines to form sturdy boxes of uniform quality at a number of widely separated plants.



- Flat blanks, shipped in bulk to each plant from a single source, take only a fraction of storage space formerly used for boxes.
- Boxmasters at each plant then convert blanks to sturdy, glued up boxes — size changes are easy, costs and packages under control.
- Uniformly attractive boxes of the same quality and construction are now used by each plant.

Whether you have one plant or several — whatever your product — if you put it in a box and use 800 to 10,000 boxes a day, then semi-automatic Boxmaster may be the economical way to get boxes. Users have made savings of $3000 to $5000 a year with just one machine. Send now for complete facts.

United

SHOE MACHINERY CORPORATION
140 FEDERAL ST., BOSTON, MASS.

man gets to know every screw and detail of the machinery in his area. While we appreciate the need of flexibility, we also try to avoid having our mechanics shift from department to department. The oiler, however, covers all departments on his shift.

These trained and specialized mechanics not only do their own jobs, but also help in the training of other workers. For example, the mechanics teach the man machine operators how to take apart and reassemble their equipment. Only mechanics or experienced operators take apart machinery — such as for the Saturday clean-up program. We think we get better results than otherwise would be the case if we let our mechanics specialize and become real experts in their assigned areas.

Need Management Support

But our training program at all levels sells people the importance of being alert to any accumulations or build-up of product or scrap particles. We are especially particular about accumulations of sugar. At the same time, we insist on the smallest paper scraps being picked up or cleaned out as soon as they appear. The damage resulting from paper fragments getting into machinery is too well known to need further comment.

We do a lot of spot checking of machine and plant conditions. Further, members of the top management group are keenly interested in plant housekeeping and cleanliness.

Let them know you like it clean. This is important. For example, if the president of our company is walking through the plant and sees some scrap on the floor, he picks it up at that time and puts it in a scrap receptacle. It certainly makes a difference on our plant personnel when a top management man stoops to pick up scrap rather than kicks it to one side or ignores it. As a result, an attitude of cleanliness-consciousness permeates the whole organization. It is really very simple: If the president shows that he cares about the condition of the floor, the man with the broom keeps it clean.

Obviously our attention to plant

For more information circle No. 249 on Reader Service Card

conditions is not limited to packaging machinery. We take similar precautions to insure proper cleanliness of floors, walls, stationary units, as well as packaging and other machinery. There are many other benefits to keeping machinery clean. In many ways it is like having a cleaned and well-lubricated automobile. It is a pleasure to drive such a car.

Caring For Machinery

Exactly the same thing applies to packaging machinery. If you keep it clean and well-lubricated, it gives your crew members a sense of pleasure in their work — something that would not be there if the machine were dirty, poorly lubricated, and vulnerable to breakdown and delay. When your machinery is kept as clean as ours, your people are not "cussing it out" all day long, as often is the case.

Keeping the machinery in this condition means keeping it in production. Thus we avoid all of the lost time such preventable breakdowns entail. We think it costs twice as much to neglect the care of machinery as it does to devote the man hours necessary to daily and weekly cleaning. In fact, if you keep things clean, it really takes very little time to maintain them that way. But once they get out of hand, your clean-up and maintenance costs go up.

Cover machinery at night. Similar precautions are followed by members of the clean-up crews. We insist that they cover certain machinery at night. We have various covers, ranging from polyethylene shrouds to heavy canvas covers. Such machines as might accumulate sugar dust require covering when not in use. These include packaging machinery, bag fabricating equipment, and similar units.

Keep Good Records

We keep adequate records where necessary. Our plant engineer keeps records on all motors and the oilers make out cards every day showing that motors have been oiled. This is done on a specific schedule, since oiling demands vary from motor to motor and may be done weekly, monthly, or every two months, as a particular motor requires. Our engineer determines these needs and the oilers follow his schedule.

Close Cooperation Pays

Close cooperation between engineering and production is another keystone in our program. Planning is most important in regard to cleaning, lubrication, and other details in order to maintain any semblance of a schedule. Our production people must keep the engineers informed in advance regarding production requirements so that a particular machine is not down at a crucial time. Elementary as this may seem, it often happens unless guarded against — as we do in our plant. Likewise, we decide each week what machines are to require special attention the following Saturday. We try to gain on production by *avoiding* what appear to be potential breakdowns. Constant attention to these details is important.

PACKAGE engineering

Classified Advertising Rates

Effective with the May, 1958, issue our classified advertising rates will be: 60 words or less, $10.00. If boxed, $20.00. Over 60 words, $40.00 per column inch.

Our classified advertising section is intended for use by those wishing to buy or sell used packaging equipment, to employ packaging personnel, seek such employment, offer or seek business opportunities. It is not available for general advertising. Terms: Cash with order.

The classified advertising in this issue appears on page 69.

fill all types of
SEMI-LIQUIDS
and
SEMI-SOLIDS
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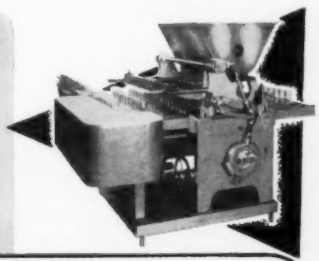

FILLING MACHINES
and get many outstanding benefits

You can fill foods, dairy products, cosmetics, drugs, lubricants and chemicals with GEYER filling machines and get these outstanding benefits: greater accuracy of fill, faster changeover from one size container to another, the handling of any type container, ease of cleaning and long, trouble-free life. Leaders in many different industries using GEYER equipment get these benefits every day.

To make sure your containers are free from foreign matter when filled, use the GEYER ROLL-OVER CLEANER. It removes glass pieces, dust and dirt from containers by inverting them 180 degrees and cleaning by air blast. This roll-over method is safety insurance for any packer because it assures positive cleaning. Speeds are from 40 to 200 containers per minute.

GEYER equipment is available in any size to meet your need. Write or call for details.

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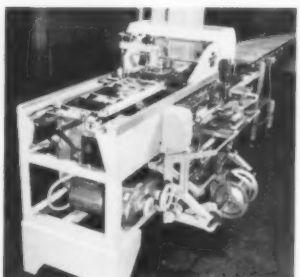
Announcements of machinery and products

1. Beneath each announcement is a code number. As you select items on which you want more information, *note* this number.
2. Now, *circle* the corresponding numbers on the postcard, located inside back cover.
3. Next, *fill* in your name and address.
4. Then, *mail* the card – we pay the postage.

Foil Hooding Machine

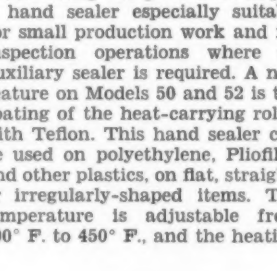
Ekco-Alcoa Containers, Inc., has developed a fully automatic foil hooding machine, Model H-1. This machine applies and crimps light gauge foil covers to rectangular or



round containers in a wide range of sizes. Crimping heads can be changed in a short time in order to handle different shaped containers. Requiring minimum floor space, Model H-1 performs the crimping operation in a straight line without lateral changes of direction. A special feature of the machine enables coil stock to be loaded at a cover height. The drive enables instantaneous changes in product flow from 20 to 60 units/min. Circle No. 1.

Hand Heat Sealer

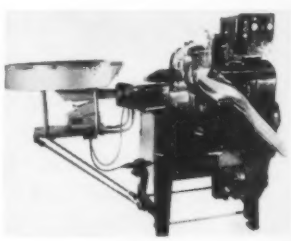
Sealine Mfg. Corp. has developed a hand sealer especially suitable for small production work and for inspection operations where an auxiliary sealer is required. A new feature on Models 50 and 52 is the coating of the heat-carrying roller with Teflon. This hand sealer can be used on polyethylene, Pliofilm, and other plastics, on flat, straight, or irregularly-shaped items. The temperature is adjustable from 200° F. to 450° F., and the heating



element uses 50 watts. The machine features a large grip for easy handling and a safety rest, which keeps the roller off table or bench when the sealer is not in use. Circle No. 2.

Twist Wrapping Machine

Package Machinery Co. announces the availability of the English-made Forgrove Model 22-B. Model



22-B, designed for faster speed twist wrapping of hard candies, handles up to 230 pieces/min. It features an automatic feed. A major modification of this machine is the introduction of nitralloy cams for all important movements, including the "geneva." Another addition is the fitting of a pay-off gear with an improved paper picker movement to insure satisfactory feeding of the paper at high speeds. Circle No. 3.

Foil Bread Wrap

Reynolds Metals Co. announces Wrapseal, a new aluminum foil bread wrap. Wrapseal is a heat-sealable lamination of foil, paper, and wax. The wrap is perforated by a new skip-scoring method

which eliminates variations encountered in other processes, Reynolds says. The result is consistent sealing of end folds where foil-to-foil contact is made. Circle No. 4.

Interlocking Containers

Vulcan Containers, Inc., announces a new 55-gal. steel drum which interlocks with adjacent containers when any number are unitized or packed closely together. The new drums, designed to save space and to reduce handling and ship-

ping costs, feature specially designed rolling hoops that are slightly offset—alternately raised and lowered—on opposite sides of the drum. The drums roll only on the hoops and therefore roll straight and can be guided easily. The containers are available with a variety of closures, accessories and fittings, sanitary and corrosion resistant linings. Circle No. 5.

Plastic Closures For Aerosols

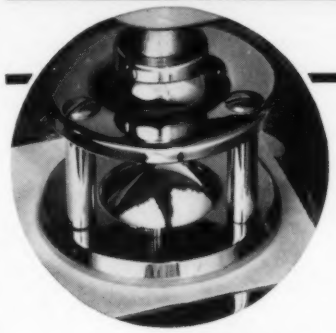
Gilbert Plastics, Inc., has a complete line of plastic closures for standard aerosol cans. These "Stack Caps" are constructed of medium impact polystyrene and are available in red, yellow, white, black, lavender, and green. Tops can be engraved with names or symbols. Circle No. 6.

Clear Packaging Film

Phillips Chemical Co. has developed a clear, strong, low-cost packaging film out of Marlex 50 polyethylene. The film is said to guard against moisture, grease, and gases over a wide temperature range without becoming sticky or brittle, and possesses a good clarity. Marlex film may be heat sealed, and is printable. Because of its relative stiffness, Marlex is said to handle more easily than conventional polyethylene in automatic push-through packaging machinery. Circle No. 7.

Printing On Glass Cartridges

Markem Machine Co. has designed the Model PAM machine for im-



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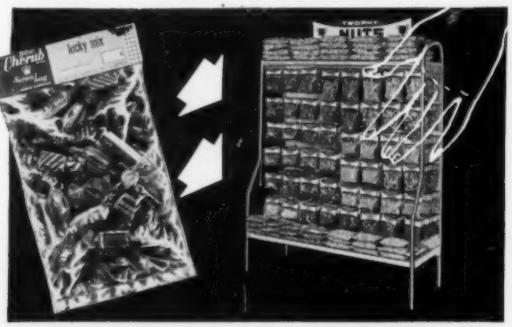

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trouble-free in operation . . . low in cost . . . this heavy-duty sealer is perfect for large or small plants. Feeds labels from a stack, folds label over top of bag, then seals bag together with label—all in one fast automatic operation. Available with hole punch or code embossing devices. Standard model will handle bags of practically any heat-sealing material and labels up to 10" wide and 4" high (flat). A special model is available for larger labels. Write, phone or wire for complete details NOW!

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GLUING COSTS UP TO 83%

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You can throw that costly, old fashioned brush-and-glue-pot away, when you install "FF" Glue Gun equipment. Because with these amazing, money-saving tools you put just the right amount of glue exactly where you want it . . . in but 1/5th the time. And they completely eliminate rejects caused by improper glue application!

Couple these three BIG, field-proven advantages with "FF's" extreme ease of operation and you'll know why users, from coast to coast, report cost reductions of up to 83% on a wide range of gluing operations.

Send for the complete story today! "FF" Gun and feeder tank combinations are available in over 100 styles and sizes to meet your individual needs. Catalog upon request.

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1107 S. Mountain Avenue

Monrovia, California

printing complete identification on glass cartridges, which are automatically fed from their packing cases to the machine. Model PAM is equipped with a holding unit for the packing case and cartridges are released through a gate at the bottom of the case into the loading chute for automatic printing and ejection. Molded rubber printing plates provide the imprints. Individual insertable control or date code numbers may be used and changed independently of the rubber plate. The maximum imprint area is 2⅞" x 6". Circle No. 8.

Carton Loader

Container Corp. of America has developed the CB-VI machine for loading cans into six-pack cartons at rates of from 300 to 600 cans/min. This mid-speed multipacker works equally well for beverages and canned food products. It is especially suitable for small and medium speed canning lines that run up to 600 cans/min. and can be adjusted for various can heights. Circle No. 9.

Heat Sealing Unit

Plastic Welding Corp. announces the Weldotron, a self-contained, high frequency heat sealing unit which electronically seals flexible vinyls, rigid vinyls, acetate, saran, kel-F, coated papers, and coated cloth. The Weldotron features foot-pedal operation with spring loaded over-ride insuring constant pressure and rapid operation. It is suitable for bag sealing, valving, spot sealing, embossing, and any seals up to 12" long. It handles acetate envelopes, vinyl bags, blister packages, etc. Circle No. 10.

Unitized Hopper Scale

Weighing & Control Components, Inc., has developed the W-C hopper scale. This scale consists basically of three pre-engineered frames —feed, hopper, and discharge— put together by building-block techniques to form the unitized weighing assembly. The feed and discharge frames can accommodate a selection of gate valves, slide gates, screw feeders, vibratory feeders, or similar units. The hopper frame contains a flexure-mounted hopper which transmits a vertical force component to the pneumatic or electric weight transmitter. The W-C hopper scale can be used for automatic batching, blending, inventory control, or other functions. Circle No. 11.

Portable Liquid Filler

National Instrument Co. announces Filamatic Model DAB-8

GOLDILOCKS gave the tip-off on SCIENTIFIC PACKAGING

• You remember the fable of Goldilocks and the Three Bears. She tried three bowls of porridge. One was too hot, one too cold, but the other was "just right".

• It's the same with packaging. There's a "just right" way to package your product—without too little protection . . . or too much.

• But the problem is in finding out what is "just right".

• Nowadays progressive packaging engineers pre-test with the IMPACT-O-GRAPH. This tells them what shocks the container must withstand during normal shipping conditions. Armed with this information, they approach packaging problems intelligently and get the "just right" answer for any packaging requirement.

• Why not let IMPACT-O-GRAPH take the guesswork out of packaging?

• N. S. T. C. approved.

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Ellisco REG. U. S. PAT. OFF. CANS

Special square and rectangular cans. Available in 25 different base sizes
Round slip cover cans in 51 different diameters
Cans may be lithographed in your design and color combinations
Round cornered, square screw top cans. Base dimensions from 2¼" x 2¼" to 11½" x 11½"
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Choose ELLISCO CANS, especially suitable for your products, from the wide variety of standard and special sizes—screw-top, friction-top, slip-cover and tear-strip—plain tin or lithographed. ELLISCO specializes in your can needs—large or small quantities. Write, wire or call for samples and prices. We are familiar with Military Packaging Specifications.

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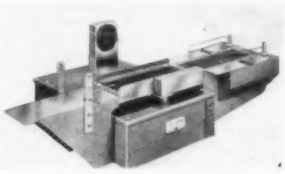
Circle No. 255 on Card

filling machine, designed for the dispensing of free-flowing or semi-viscous fluids, including aqueous solutions, oils, syrups, suspensions, etc., at rates from 3 to 60 fills/min. The volume of fill is adjustable from .002 oz. to 16 oz./stroke. Vials can be filled singly, two at a time, or in multiples of two. The Filamatic DAB-8 is comprised of two positive displacement, stainless steel pumps with adjustable Teflon piston rings. The piston pumps are actuated by an electronically controlled, variable speed motor. Circle No. 12.

Automatic Checkweigher

Toledo Scale Corp. has developed the Model 9455 automatic checkweigher. This electromechanical unit is capable of handling items weighing up to 32 oz. with an accuracy of + or — 1/16 oz. Size of the items may range up to 6" wide by 12" inches long. The unit can handle up to 60 items/min. The conveyor portion of Model 9455



consists of a weigh section with motorized conveyor, and an approach and take-away section. A motorized take-away and a diverting gate mechanism reject out-of-tolerance items. All parts of the unit in direct contact with items being checkweighed are constructed of stainless steel or other material approved for use in food processing. Circle No. 13.

Stretchable Paper

West Virginia Pulp and Paper Co. announces Kraftsman Clupak, a stretchable paper said to permit up to 20 per cent less paper to be used in such products as multiwall sacks with no loss of strength. In laboratory tests a 50-lb. sample of Kraftsman Clupak paper withstood almost as much tensile stress as regular kraft paper, but stretched 12 per cent before breaking, whereas regular kraft paper has virtually no stretch quality. This new paper is smooth surfaced and in appearance resembles regular kraft paper. Kraftsman Clupak is being offered in multiwall sack, asphalting, waxing, and standard converting grades. The paper will be available in all normal basis weights, ranging from 30 to 70 lbs. Circle No. 14.

CLASSIFIED ADVERTISING

See our ad on page 65 for rates.

Circulation this issue in excess of 35,000

FOR SALE

For Sale — Packaging machine, Battle Creek Model BT30 and Bond M L Dual Filler. Fills, seals folding boxes, both bottom and top. Continuous flow principle. Quickly convertible. Wide range of boxes up to 10 inches in height, 30-40 per minute. Price new machine $15,120.00; this used one $5,000.00. Reply to W. J. Wittekind Co., 1041 Richmond Street, Cincinnati 3, Ohio.

For Sale — Brand new (less than 100 hours of operation) Bartelt Automatic Packaging Machine, complete with both liquid or paste type filler and volumetric type filler for powder or granular mixes. 7" Indexing—for minimum size package— 2" x 2", maximum size package—5-3/4" x 7-1/2". Automatic heat controls for sealing bars—(cooling bars included). Tooled for standard bags or bottom gusseted bags. Maximum cycle speed—90 packages per minute. Stainless steel and chrome plated construction. Price, new—$22,500. Please reply to Box 401, Package Engineering, 185 N. Wabash Avenue, Chicago 1, Illinois.

POSITIONS AVAILABLE

Printing Foreman Wanted — Excellent opportunity for mature, qualified person to head Night Printing Section of important Flexible Packaging Converter. Good operating knowledge of Kidder Presses and other phases of flexographic makeready essential, along with administrative ability. Annual salary, $10,000.-00 starting, for qualified applicant. Our staff has been notified. All replies confidential. Please reply to Box 402, Package Engineering, 185 N. Wabash Avenue, Chicago 1, Illinois.

Sales Engineer — To survey and promote markets for new types of film in both industrial and/or packaging applications. To consult with established and new customers in improved methods or techniques for using existing and new type films. A knowledge of packaging equipment essential. 3 to 5 years technical background preferred. Some travel involved. Send resume and salary requirements to R. W. Johnson, Celanese Corp. of America, 290 Ferry St., Newark, New Jersey.

Help Wanted — Expanding Model Making Department of Folding Box Manufacturer with National Plant and Sales representation. Require good creative and administrative ability as well as qualified sample makers. Salary commensurate with experience. Send resume data sheet with photo to Box 403, Package Engineering, 185 N. Wabash Avenue, Chicago 1, Illinois.

Packaging Salesmen — Uniquely profitable straight commission openings in many local areas to handle our new, fully-tested line of transparent poly cello and poly plastic pressure-sensitive tapes. Our basic aim is direct sales to industrial users. Write General Tape Corporation, St. Paul 1, Minnesota.

Kushion-Kraft

is used for efficient and economical cushioning, interior and exterior packaging, surface protection, shock absorption

KUSHION-KRAFT consists of plies of processed and rugated papers in either kraft or facial tissue or a combination of both. Thickness and strength is controlled by the number of plies and the type of paper used.

The variety of combinations of facial tissue and kraft permits every shipper to order a specific type of KUSHION-KRAFT material best suited for his product's shipping requirements.

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2. Now, *circle* the corresponding numbers on the postcard, located inside back cover.
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4. Then, *mail* the card — we pay the postage.

Cushioning Material

Fiber Bond Corp. offers a ten-page illustrated booklet describing "Fiberkor," a protective cushioning material bonded to corrugated board or kraft paper. The material provides insulation and absorbs shock. "Fiberkor" molds itself to the shape of the product without scratching delicate surfaces. A performance test report is included. Circle No. **101.**

Protective Wrapping Paper

Central States Paper & Bag Co. has prepared a folder showing some of the uses for its Pro-Tex-Mor paper. This paper may be used in wrapping products that have wood, metal, or plastic finishes. The smooth surface of the paper will not scratch finishes and does not stain, stick, or leave a "wax transfer," Central States says. Sheets, bags, or tubes of Pro-Tex-Mor can be supplied to individual specifications. Circle No. **102.**

Vacuum Forming Machine

Comet Industries has a two-page brochure which describes it Meteor vacuum forming and packaging machine. The Meteor is suitable for short runs and laboratory work, as well as for full production runs. It is available in three sizes, the smallest of which has a 20" by 30" mold area. Specifications and prices are included in the brochure. Circle No. **103.**

Outsert Applicator

The Pfaudler Co.'s Bulletin No. 933 presents details on Model OA-3MC, an outsert applicator machine. This machine tapes material onto the outside of round containers at speeds up to 220 containers/min. It is useful for attaching promotional material, previously hand-taped to such containers. The machine automatically positions the container so that the leaflet is taped to a predetermined spot and does not obscure the container label. Circle No. **104.**

Silicone-Coated Glass Adhesives

Polymer Industries, Inc., offers a number of technical bulletins which describe its Glas-Bond adhesives for labeling silicone-coated glass containers. Glas-Bond adhesives permit adhesion of labels to difficult surfaces such as opal, borosilicate, and other glass containers. The bulletins describe various types of adhesives in the Glas-Bond line and give pertinent specifications and uses for each. Circle No. **105.**

Plastic Containers

The Vichek Tool Co. has published a brochure giving various details about its line of plastic boxes. These containers, 20 standard designs in all, are available with clear covers, solid covers, all clear or all solid cover and container, or in combinations of clear and solid plastic. Round and rectangular shapes are available, with many varieties of compartment size and number. Boxes can be colored to meet individual specifications. Circle No. **106.**

Bag Making Machine

Bagmatic Products Corp. offers literature on its Model No. 31 side-weld polyethylene bag machine. The Model No. 31 will make side-weld bags with or without a lip, with or without bottom gusset, and up to 30-1/2" in length. It features a self-adjusting sealing mechanism and a method of dwell-time control which can be regulated independently of the actual machine speed. Circle No. **107.**

Stencil Marking

Marsh Stencil Machine Co. has a folder entitled "How to Improve the Marking and Taping of Your Shipments," which offers a number of ideas on the stencil marking of shipping containers and describes its line of electric taping machines for sealing cartons. Many stencil supplies and a number of taping machines are pictured in the folder. Circle No. **108.**

Film Packaging

Amsco Packaging Machinery Co., Inc., has a new brochure describing its Twistite/Shrinkwrap packaging equipment. This line is designed to handle irregular, round, oval, or large regular shaped products. The brochure demonstrates how to wrap single or double film around a product from rolls, and twist the film ends to form a close fitting wrap. It also describes how, when using heat-shrinkable films on Amsco machines, products can be placed in a shrink tank to obtain an air-tight, watertight, wrinkle-free package. Circle No. **109.**

Plastic Information

Cadillac Plastic & Chemical Co. has a folder entitled "Facts About Plastics." The four-page, pocket-size brochure compares outstanding properties and typical industrial applications of eleven major plastic families in common industrial use. Included are acrylic, nylon, Teflon, polyethylene, flexible and rigid vinyl, cellulose acetate, polystyrene, high impact, phenolic and fibrous reinforced polyesters and epoxies. Circle No. **110.**

Liquid/Semi-Liquid Fillers

Horix Mfg. Co. offers a new comprehensive catalog, No. 581-P, featuring its line of fillers for liquid and semi-liquid products. A full range of machine sizes and types is given—from hand-operated to fully automatic rotary models. The catalog is sectionalized into gravity-vacuum type fillers. Included are large illustrations, along with production statistics such as speed range, products handled, and outstanding operational features. Circle No. **111.**

Parts Feeder

U. S. Engineering Co. presents information about its Hoppermatic parts feeder in Brochure B-31. The Hoppermatic machine features quick changeover, making it possible to switch from one size or shape to another within minutes, and adaptability, which permits the machine to handle a wide variety of items, ranging from hardware to bouillon cubes. Feeding rates up to 200,000 parts/hr. are possible. Another model of this machine is the electronic Hoppermatic, particularly useful where large counts are required. On the electronic Hoppermatic, the release mechanism is replaced by an

electronic counting device. Circle No. **112.**

Multiple Packaging

Continental Can Co. has available a booklet called "Off to the Races with Multi-Pack." This illustrated booklet contains information on the hand- loaded "Can-Trak" and machine-loaded "Jak-Et-Pak" carry cartons. In addition, data on the can sizes and formations handled by the Jak-Et-Pak carton loading machine are included. Circle No. **113.**

Screw Capping Machine

Camco Sales, Tite-Cap Machine Div., has literature on its single-head, fully automatic screw capping machine. Output of up to 60 containers/min. is possible and the machine is equipped with adjustable speed drive so that the output may be regulated according to requirements. Fragile plastic caps and metal caps of all sizes and shapes are handled by this machine. An improved chuck with flexible jaws combined with an adjustable tension device helps prevent breakage of plastic caps. Circle No. **114.**

Vibratory Equipment

Syntron Co. announces the availability of a condensed catalog, No. 5712, which describes its line of vibratory bulk materials handling equipment. Included is information on vibrators, packers and jolters, car rappers, hopper level switches, flow control valves, feeders, screens, parts feeders, paper joggers, infrared heating elements and panels, etc. The catalog has 60 pages of illustrations, descriptions, and specifications. Sales representatives are listed. Circle No. **115.**

Envelope Gums

H. B. Fuller Co. offers a brochure on adhesives for envelope manufacturers. The booklet features sections on front seal, back seam, and window gums. A short description plus technical data is included on each product, as well as information on the mixing and storing of adhesives. Circle No. **116.**

Impact Recorders

The Impact-O-Graph Corp. has a four-page folder presenting data on its impact, acceleration, and gravity recorders. The recorders are small in size and light in weight; they record data permanently on a special wax-coated recording tape. The machines are used to record shocks, impacts, and vibrations from any direction. Three styli, each operating independently, record vertical, lateral, and longitudinal forces on the marking tape. The results are indicated in g's, feet per second, free fall, and foot pounds. Circle No. **117.**

Blister Packaging

Tronomatic Machine Mfg. Corp. offers literature on its blister package sealer. This machine requires no vacuum pumps. The product is packaged by inserting the blisters in a nesting tray. The products are dropped in the trays and are covered with coated cards. When the loaded tray is placed on the blister sealing machine lower plate, the press is actuated and the sealing dies come down. The press stays down for a predetermined time, usually 5 to 8 sec., depending upon the thickness of the card. Circle No. **118.**

Drum Reconditioner

The Portland Co. offers Bulletin #85, describing the Portco drum reconditioner. This machine automatically strips paint from the outside, cleans contents from the inside, and rinses and dries both interior and exterior of drums with a single handling. Six models are available, ranging from single station to six station in size. Illustrations, general specifications, and operating details are included in the folder. Circle No. **119.**

Roller Type Glue Gun

John P. Fox Co., Inc., has information on its selection of roller-type glue guns, used for applying a ribbon coating of glue to any flat surface. Featuring stainless steel construction and non-clogging design, the guns are said to cut gluing costs up to 67 per cent, to minimize operator fatigue, and to speed up the gluing cycle. Useful for carton sealing, paper converting, and a wide variety of wood working applications, these guns handle low viscosity, cold gluing compounds. Circle No. **120.**

Glassine and Greaseproof Papers

Rhinelander Paper Co. has a sample kit that includes samples of 54 of its glassines, greaseproof papers, and paper specialties. Explanatory copy discusses properties of each sample and suggests end uses for which each sample is best suited. Circle No. **121.**

Electronic Counters

Post Machinery Co. Bulletin B enumerates features of ten different models of electronic production counting instruments. They are used to operate a control when the desired count is reached, thus regulating the flow of product. Circle No. **122.**

Self-Sealing Containers

Growers Container Corp. offers a folder describing its self-sealing corrugated containers. These boxes have flaps that are dry to the touch and are factory-treated with Presseal, so that the flaps adhere to each other at finger pressure. Although these flaps adhere to themselves, they will not stick to anything else, Growers says. Circle No. **123.**

Packaging Machinery

Peters Machinery Co. has an eight-page catalog of its packaging machinery, including equipment for carton forming and lining, carton folding and closing, and carton and tray forming and gluing. Carton sizes, machine specifications, and installation floor plans are included. These machines range from 30 to 175 or more units/min. Circle No. **124.**

Straight Line Filler

The Filler Machine Co., Inc., offers an illustrated data sheet on the Model SL-55 straight line filler. This is designed to handle semi-liquid and semi-solid products such as jellies, mayonnaise, salad dressing, cosmetics, pharmaceuticals, petroleum, and chemical products. Five types of this model are available offering speed ranges up to 300/min.

TECH DATA from STAN-PAK

ATMOCEL

One of the many film, foil and paper combinations developed by Standard Packaging Corporation, ATMOCEL is strong and tough with very low WVTR and GTR. This clear material has proved excellent for extended shelf life in or out of refrigeration.

Here are the primary characteristics of its major forms:

ATMOCEL

	Lamination		Extrusion	
Code	97	98	F20	N20
Yield (1)	6,780	8,090	7,200	8,480
WVTR (2)	0.27	0.40	0.27	0.46
O_2TR (3)	0.19	0.20	0.19	0.22
Tensile (4)	13	11	14	11
Burst (5)	49	20	46	18

(1) in.2/lb. (2) g/100 in.2/24 hrs.
(3) cc/100 in.2/24 hrs. 39°F-0276-86% RH
(4) lbs./in width (5) Mullen

The properties of these structures suggest use as a packaging medium for cheese, luncheon meat, and all products which require low WVTR and GTR. ATMOCEL can be obtained printed flexographically or by gravure, surface or reverse, and is available in roll or pouch form.

For more complete information on these and other film combinations, write to our Technical Director.

STANDARD PACKAGING
CORPORATION
FLEXIBLE PACKAGING DIVISION
1 LISBON STREET, CLIFTON, N. J.

It is constructed to handle 1/2 oz. to 32 oz. glass, metal, and plastic containers. This unit features air-operated valves that cut off instantaneously regardless of the cycle speed, a no-container—no-fill device, and stainless steel construction of contact parts and parts around the filling zone. Circle No. **125.**

Net Weigher

U. S. Automatic Box Machinery Co., Inc., has an information sheet listing features of the Scott net weigher. A precision machine, it is available in four models that handle fills of 1 oz. up to 5 lbs., at speeds up to 40 weighings/min. Unit is adapted to free flowing and semi-free flowing dry products. Circle No. **126.**

Wrapping Equipment

Conapac Corp. has a four-page folder describing its model B and Model K Roto Wrap equipment. Model B handles packages from 3/4" to 6" wide, and from 1-9/16" long upward. Model K handles strip packaging of products up to 1" in dia. Specifications of each machine are included in the folder. Circle No. **127.**

Corrugated Bulk Containers

Gaylord Container Corp. offers a bulletin that lists nine ways you can save packing and shipping costs by using corrugated bulk containers. Holding up to 2,000 lbs. of bulk material, these containers are siftproof and are suitable for handling powders, flakes, chips, lumps, pellets, sticks, etc. Circle No. **128.**

Stapling, Tacking Units

Fastener Corp. offers a 28-page catalog which describes and illustrates its complete line of Duo-Fast manual and air-operated stapling and tacking equipment. Model numbers of each item, the type of staples that may be used, and special features for different users are included. Description of guides, attachments, and other accessories available are enumerated. Circle No. **129.**

Polystyrene Packages

The Dow Chemical Co. has released a 24-page "Supplement to a Catalog of Packages." Illustrations and specifications of over 60 different polystyrene container styles are included, as well as the names and addresses of molders producing them. Square, round, rectangular, and irregularly-shaped containers, vials, and tumblers are available. Circle No. **130.**

Coiled Hot Melt Adhesives

United Shoe Machinery Corp. manufactures Thermogrip, a solid, thermoplastic adhesive supplied in a continuous cord-like form. This product is described in a four-page brochure. Thermogrip cements kraft and other papers, chipboard, polyethylene films, coated paper and board, wax-coated paper, aluminum foil, etc. Circle No. **131.**

Bottling Line Divider

Economic Machinery Co. offers Bulletin MP-280, which devotes four pages to specifications, pictures, and floor plans of the "Multi/Purpose Divider." This machine is designed for dividing bottles or cans into 2, 3, 4, or more lines for inspection, case packing, filling, banding, or labeling purposes. These dividers can be custom engineered for any location to provide efficient container handling. Circle No. **132.**

Package Makers and Wrappers

Battle Creek Packaging Machines, Inc., offers a 16-page brochure that pictures and describes 26 different wrapping machines and package makers for bakery products. Circle No. **133.**

Carton Printer

E. L. Bivans, Inc., describes Model 321 carton printing attachment for its carton set-up machine in a data sheet. This unit prints single or multiple lines in either direction within a 1-1/2" by 1-1/2" area. Cartons may be printed on right panel, back panel, or top panel. Type changes can be made in two minutes. Circle No. **134.**

Faster setting adhesives boost production line speeds

(Continued from Page 29)

adhesive is utilized. No loss of adhesive is encountered in shutting down application equipment because the adhesive is non-volatile and is useable again by re-melting.

Make bonds immediately. The outstanding features of resin hot melts are their extremely fast setting nature resulting in the ability to make adhesive bonds immediately, and their ability to bond difficult and impervious surfaces which heretofore were a mechanical impossibility.

Thermoplastic hot melts, while not a cure-all for every limitation of common adhesives, are the fastest setting adhesives today, and are suggested as a useful tool in working toward the ultimate in high-speed production.

Making a new packaging line fit into an existing plant

(Continued from Page 34)

least, proper employee training. Further, we have a maintenance and lubrication program to avoid improper lubrication and to provide preventive maintenance.

Fixing of responsibility. This program tends to actually fix responsibility for required duties and as a result everyone knows what he is to do and we avoid such commonly encountered problems as "I thought *he* oiled the machine." The guesswork is taken out of equipment maintenance and, of course, ties in with our general approach to the proper over-all planning.

We have attained these results even though our line has certain handicaps on it as yet. An obvious delaying factor is the temporary use of a mailing card. This operation requires hand insertion in each carton, and without the card the line, of course, could run faster.

Use Of Line

In addition to the sizes of Citroid variance, this line also handles No Doz 36's (10-dram vial) and 4-Way 72's (1-11/16-ounce bottle). The principal mechanical changes are two simple adjustments on capsule counter or tablet counter, changing jaws on cottoner and capper, possible worm feed change on labeler, and simple adjustment of carton machine. A basic objective is to cut down to a minimum the number of changes to be made on any line when handling different products. This is in line with our established method.

Attaining line flexibility. We have designed our line for ease, rapidity, and quickness of change-over, as well as for convenience and effectiveness of personnel. As our packaging operation developed, we had to make only slight adjustments in our training program. The operations were basically similar to those done elsewhere in our plant.

We try to train operators so they are as versatile as possible. We seek to make our girls interchangeable on the different jobs on the line. We also try to use them elsewhere in the plant as needed. Flexibility of personnel training is very important.

There is a continuous housekeeping job in progress. Breakage and spillage are cleaned up immediately. There is a dust collector on our fillers. We insist the line be kept clean and it is cleaned during the morning, noon and afternoon relief periods.

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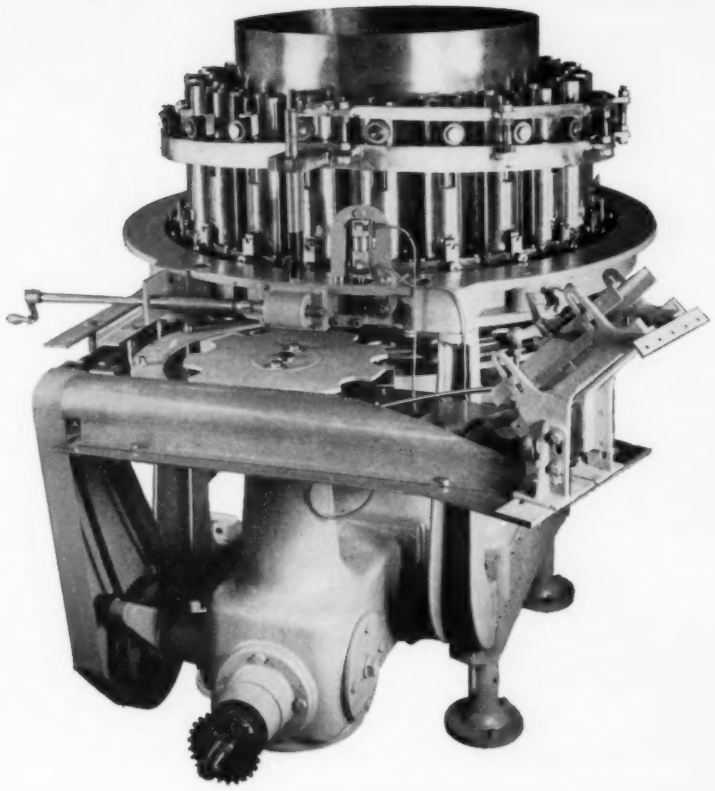


New 21-station food filler
Speed: up to 500 cans per minute
Accuracy: ±0.1 fluid ounce

Now you can package viscous and semi-solid products at fast production rates without wastage and without complicated controls and costly maintenance.

1. New plastic infeed screw handles containers more smoothly, stops jam-ups.

2. "No container—no fill" control stops spills.

3. New positive positioning filler valve control. Valve roll now retained in double grooved track to prevent valve from drifting.

4. Container tilt easily controlled to compensate for centrifugal force, preventing product throw-out with new adjustable, double-open-track container path through filler.

5. New control mechanism for accurate fill is located for safe, easy, and quick adjustment.

6. Complete adjustment of fill through full range of cylinder—4 to 32 oz.—without additional parts.

7. Filler *engineered* to give precise, synchronized transfer of filled containers to auxiliary or closing equipment.

8. No keys or pins to fail or loosen since there are splined shafts throughout (except drive connection).

9. Access to *all* gears and shafts *through base of filler.*

There's more to the story of this model RPC-21 and the complete line of Pfaudler piston fillers in our technical bulletin No. 959. Write for copy.

THE PFAUDLER CO.

a division of PFAUDLER PERMUTIT INC. • Rochester 3, New York

For more information circle No. 258 on Reader Service Card

What we think

Let's take a fresh view of research

How to manage the research and development function and how to handle the day-to-day relationships of those participating in packaging research are two questions deserving a lot more attention than they now get. There are many variations in practice and much confusion rampant.

We find few package user organizations with a clear pattern for what they do. Some have articulate, well managed research organizations marked by a singleness of purpose. Others fall short of this. Some waste too much time and effort duplicating studies and information already available.

Don't misconceive the reason for research

Some unsophisticated managers think of research as fiddling with test tubes and "messing around" in the laboratory. They overlook that the purpose of it all is to *prove* something. Unfortunately some researchers themselves overstress the laboratory work. Further, they fail to take advantage of what is already known in the prior literature or available through study.

A lot of what passes for research could be done in a library with the aid of International Critical Tables, a pad of paper, a pencil, and a log book or slide rule, plus occasional reference to published researches. Few top managers responsible for research and some researchers themselves appreciate the extent to which the world's scientific knowledge has been reduced to actual figures in the volumes of International Critical Tables, affectionately called the "intentionally cryptic tables" by the late Clarence J. West, beloved and indefatigable scholar and bibliographer of the paper industry, as he sought to ease students as gently as possible into the full impact of this monumental work. —of which he was an editor.

Some users tell us their suppliers seldom have original ideas. Some suppliers tell us the users try to duplicate on their own premises testing and evaluating activity the suppliers have already done and would gladly make available to them. On the other hand, some companies short on research and development facilities lean heavily on suppliers and converters.

It is time that we develop standards of practice to clarify these relationships. Some companies have excellent arrangements between themselves and their suppliers, others are more haphazard, often downright casual. At the moment the situation is far from clear.

Another problem is this: How can we spark the inspiration of the great minds within and without user companies who come up with new packaging ideas and at the same time protect a firm from subsequent claims arising from its perhaps unwitting use of a retroactively disputed idea. Stimulated by their counsel, many companies have formal procedures for dealing with inventors and researchers offering new ideas. Occasionally a firm gets a package into national distribution, then finds itself confronted with a plaintiff's counsel charging "infringement" and making sounds about an accounting of profits.

We doubt that these problems would arise in a company with a clear grasp of research and development and a proper organization for it. If a user firm has its own house in order, it knows what original research it should do, and what activities it should avoid—activities covered by the prior research of suppliers and others. It then would be in a position to apply this standard to its relationship with suppliers as well as between researchers and managers in the company.

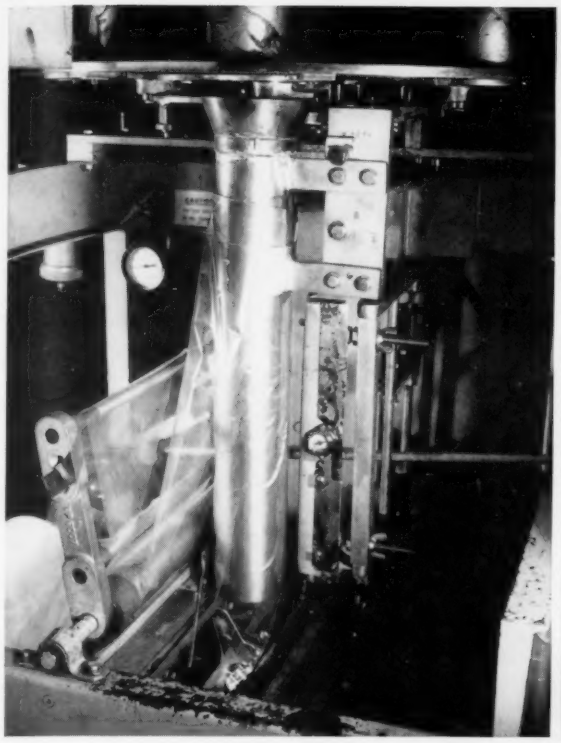
Let's have a better sharing of information

There should be nothing less than full mutual confidence. No user can expect help from a supplier when he holds back certain facts or experiences that would affect the work by the supplier. Likewise, no producer or converter of packaging materials can enjoy a similarly harmonious relationship with its customer if it holds back anything for use elsewhere or at some future time when dealing with the instant customer.

Lest these considerations seem too obvious to mention, the fact is their absence in application is causing a lot of confusion. If we develop a true understanding of research and development, and set our own house in order, we have a proper basis for our relationships with other companies and individuals. The total effect of all this: A general upgrading of package research.

Bruce Holmgren

Editor



Machine Packagers Need the Uniformity of

VISQUEEN FILM

TRADEMARK

"Machine packaging with polyethylene demands a film of utmost uniformity. This we get in VISQUEEN film," says Mr. J. Reilly, production manager for H. B. Ives, manufacturers of builders' hardware at New Haven, Connecticut.

The Ives packaging operation employs "Vertipak" equipment on a large variety of products.

"We specify VISQUEEN film because it has done a better job than any other on our machines. It's tough, strong and easily handled. Our output is high, our machine costs relatively low," says Mr. Reilly.

If you employ machine packaging, VISQUEEN film can save money for you. If you hand-pack, you may be able to convert to machines advantageously. Ask for our technical assistance. The request tag is for your convenience.

Information request tag

VisQueen

Trade Mark

clip this tag—#PE4
attach to letterhead, mail.

PLASTICS DIVISION

VISKING COMPANY *Division of* UNION CARBIDE *Corporation*

P.O. Box 1410, Terre Haute, Indiana

In Canada: VISKING COMPANY, DIVISION OF UNION CARBIDE CANADA LIMITED, Lindsay, Ontario

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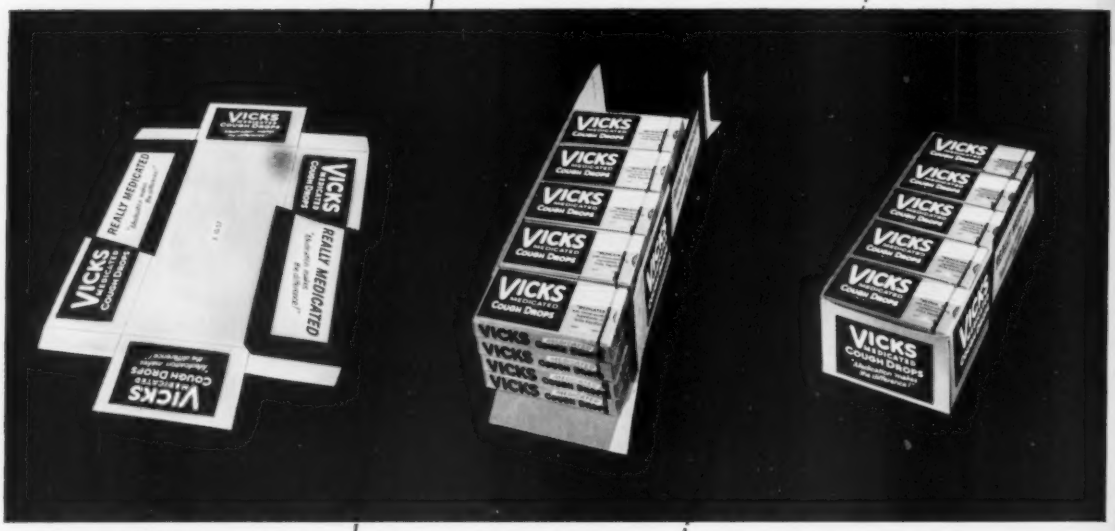
For more information circle No. 259 on Reader Service Card

Automatic Tray Forming and Loading: Jones Tray Packer automatically feeds flat tray, forms it, inserts it in a rigid pocket, collects, stacks and inserts 20 Vicks cough drop boxes through end of tray, closes and seals flaps.

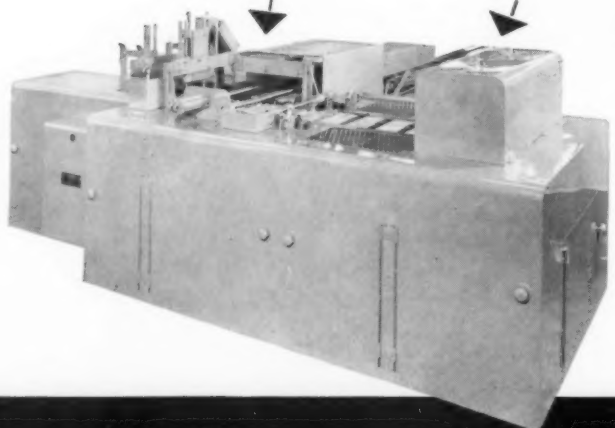


Save Material: With the Jones Tray Packer, you use the flat tray, the lowest cost container. Expensive pre-glued, snap-open tray is now outmoded.

Save Labor: Product automatically inserted thru the end. Eliminates manual top loading of pre-glued tray.

Save Equipment: Separate machinery for forming trays and transferring them to the loading stations no longer needed.

Cut tray packing costs automatically with the new JONES TRAY PACKER



Accelerated packaging line rates emphasize the need for a more efficient method of putting products into a tray (or shelf) pack. Jones meets this need with the new Nova Motion Tray Packer, the first machine to combine *automatic* tray forming with *automatic* loading.

This Jones machine, using only one operator, collects 540 Vicks cough drop cartons from four packaging lines to produce 27 trays per minute.

It pays for itself out of your immediate material, labor and equipment savings.

If your product is uniformly shaped, and moderately rigid, it will pay you to investigate the Jones Tray Packer.

R. A. & COMPANY, INC.

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